Smart Computing
IN PLAIN ENGLISH
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Discover Your Hard Drive's Hidden Megabytes—And Improve Its Performance

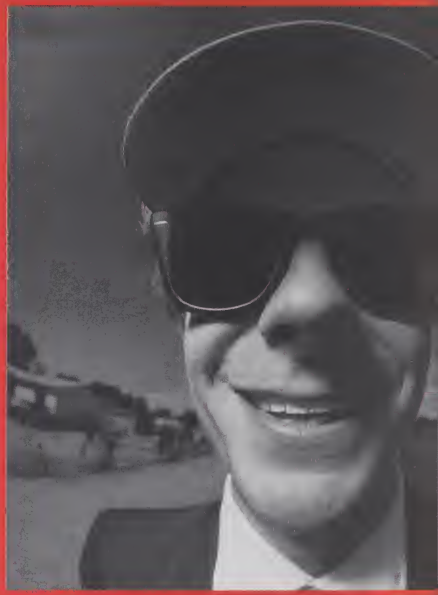
Plus:

Zip Drive Tips

Should My PC Have DVD?

ade Graphics Performance

v: Netscape's New Browser



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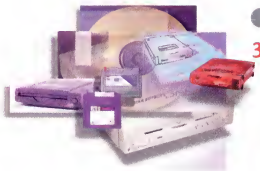

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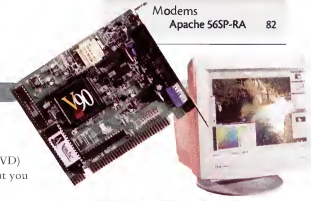

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About The Site ...

If you're looking for a comprehensive computing reference, look no further than the *Smart Computing* World Wide Web site. Our searchable site provides the complete text of issues available on newsstands, plus previews of upcoming issues. The archive includes articles from past issues of *Smart Computing* and the popular *Guide To* and *Learning Series*. Check in regularly; new information is added daily.

Tip Of The Month: ***Searching By Date*** **—** When searching our article archive, you can narrow your initial search by using the date feature at the bottom of the results page. Enter a range of dates, and the search engine will return only articles that were published between the specified dates.

Upcoming Issues ...

PC Novice Guide To: Computing–Portables & Windows CE

Advice on picking the right portable and a complete introduction to Windows CE.

PC Novice Learning Series: Enhancing Web Sites

Detailed tutorials to help you utilize the Web more effectively.

Smart Computing/ PC Novice Reference Series: Dictionary (Third Edition)

Computing terms, the origin of computing, and industry trends.

Corrections/Clarifications

The October 1998 issue's FAQ section incorrectly stated that only motherboards with Pentium II processors can use AGP. In fact, motherboards that use AMD or Cyrix processors now also incorporate AGP.

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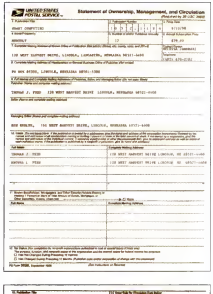
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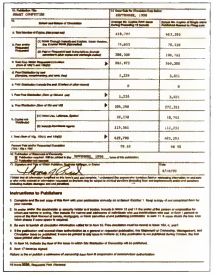

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Compiled by Lori Robison

Viral Infections Keep A Healthy Pace

When antivirus software maker Symantec spotted the first **Java** virus, *Strange Brew*, a few months ago, Internet safety fears once again surfaced. (Java is a popular programming language that runs on many types of PCs.) Strange Brew is not deliberately destructive, however, and Java browsers' security features made it unlikely the infection would extend to users. But the discovery was significant because it signaled that damaging Java-class files were now a slight possibility. The key to the threat, according to Symantec, is the virus' alteration of how infected files handle error-checking and exception handling.

Strange Brew's arrival sent a strong reminder that the virus threat is as strong as ever. Symantec estimates that American businesses lose as much as $550 million a year from unauthorized access to company computers. Computer viruses have infected Fortune 500 companies, government agencies, and universities. A recent study by The International Computer Security Association (ICSA) found that viral infection has increased by 48% over last year.

These viruses, however, are not all-powerful. The viral influence cannot pierce files on write-protected diskettes or documents. (The exception to this is the Word macro virus, which can infect documents and templates written in *Word 6.0* and above.) Viruses can't touch compressed files either, unless the infecting agents were planted before compression. All these marauders can do their damage only if an infected application is first executed or a computer is started from system files on an infected diskette.

Barn Owl Software, which posts a site at http://www.kumite.com to educate consumers about the myths and facts of viral computer infections, claims that the majority of "new" viruses are only variations of the well-known viruses (estimated at about 500). While admitting the problem is real, these experts say the best insurance against a virus attack is a good backup system. This lets users restore important documents, databases, and spreadsheets without restoring the infected program.

Another option is antivirus software. Several companies on the Internet, including Symantec, Sophos, Data Fellows, and SafetyNet, offer a variety of antivirus software, which users can download from the 'Net. ■

Effects Of Viruses (1997-1998)

A RECENT INTERNATIONAL COMPUTER Security Association (ICSA) survey on the effects of computer viruses found loss of productivity to be the biggest problem. These losses included loss of data, unreliable applications, and system crashes.

Effect	Percentage	
	1997	1998
Loss of user confidence in the system	26%	19%
Threat of someone losing their job	1%	4%
Loss of productivity (machine, applications, or data not available for some time)	70%	72%
Screen message, interference, or lockup	54%	58%
Lost data	37%	31%
Corrupted files	57%	57%
Loss of access to data (such as on server, host, mainframe, etc.)	30%	37%
Unreliable applications	30%	24%
PC was unavailable to the user	59%	57%
System crash	26%	20%
Trouble saving files	54%	46%
Trouble reading files	57%	51%
Trouble printing	23%	24%
Other (specify)	3%	1%
None	12%	6%
Don't know	1%	1%

E.T. Could Be Calling You

Scientists at the University of California-Berkeley are offering the people of earth a chance to join in the search for extraterrestrial life through a project site called SETI@home (http://www.setiathome.com).

Through technology utilized in the breaking of encryption codes, scientists at Berkeley's Space Sciences Laboratory hope to address the complicated computing problems associated with scanning the sky for alien radio signals. The key is sharing the work. By distributing data through the vast networks of smaller computers connected to the World Wide Web, the project gives individual computers their own slices of the data pie from the Arecibo radio telescope in Puerto Rico. Each PC will then analyze the information, send it back to the main computer at the project's headquarters, and begin work on the next piece of pie.

So far, tens of thousands of Web users have signed up to participate in the two-year project, set to launch in late 1998 or early 1999. Minimal effort goes into participating. SETI@home operates like a screen saver, analyzing data from the world's largest radio telescope only when the PC is idle. The program will not affect normal PC operations. Individuals will be initially unaware, however, if their computer makes a discovery. Scientists must check and reanalyze any tantalizing data before acknowledging any breakthrough, but the team assures volunteers that the individual who receives an alien "call" will get the credit. SETI@home accepts volunteers for the project at its Web site. ▮▮

COBOL Lives

Fear not, COBOL experts. The turn of the century will not necessarily mean the end for professionals versed in the legacy program language.

Organizations have been clamoring for COBOL-literate programmers to solve the Year 2000 (Y2K) problem, which is often rooted in the lines of older COBOL programs. But consequent demands for closer and more preventative network system and mainframe supervision will continue to drive the market for program specialists, says Carlton Showe, president of IMI Systems Inc., a technology consulting firm in Melville, N.Y.

COBOL code still exists in most mainframe systems, Showe says. After the code is converted for Y2K, many businesses will keep the program language experts on staff to maintain a stricter watch over internal Information Technology (IT) systems.

Officials at Computer People Inc., a professional services firm in Philadelphia, say that many companies are behind in addressing the Y2K issue and that skilled programmers will remain in demand well into the next millennium.

Showe also says that with seven-digit phone number combinations approaching its limit in the United States, a 10-digit conversion may not be far in the future. Such a situation then requires a massive conversion and the skills of numerous COBOL programmers. ▮▮

Tech Shorts

NOW THE FREE E-MAIL service that millions love is offering World Wide Web access and expanded mail services. Juno's *Web 2.0* Internet software will provide customers full Internet access using standard Web browsers for $20 a month. Customers also can choose Juno Gold for $5 a month and get the ability to send non-text files, such as pictures, spreadsheets, and formatted documents, along with electronic messages.

Sprint Corp. and CD World recently announced a partnership to let music fans make a custom compilation of favorite songs on a single recording medium. The companies will begin setting up Music Points at participating vendor locations in New York and Los Angeles this winter. Customers will be able to choose from 50,000 song titles to record 45 minutes of music on a blank CD for about $18. If the idea catches on among consumers, these music vending-machines could begin appearing in cities across the country.

Thanks to a couple of software products from Roadtrac and Ease Simulation, parents will be able keep a closer eye on the driving habits of their household's youngest license holders. The Ceres Personal Tracking System from Roadtrac of Georgia sells for $650 with a $100 installation fee and uses satellite mapping and cellular telephone technologies to track a car's location. The product also comes with an optional $75 CD-ROM, which will turn a home computer into a car monitor. AutoWatch from Pennsylvania's Ease Simulation operates like an airplane's "black box," recording such things as how far and how fast the car is driven. The tamper-proof product sells for $295 and works with the car's computer diagnostic system to make its recordings. Limits for vehicle and other functions can be set by plugging the system into a computer, which also can produce a readout after the car's return. ▮▮

Hardware

Designed as a copier you can carry with you, the Hewlett-Packard (HP) CapShare 910 offers speed and copy quality comparable to office copiers. With the copier's page-processing technology, the light-weight CapShare 910 ($699) can scan in partial sections of a document and then piece it together in its proper form without overlap, displaying a picture to indicate any parts missed originally. The 910 model, which runs on two AA batteries and is about the size of a CD player, can store up to 50 pages of documents. (877/473-6772, http://www.hp.com).

▶ The Epson Perfection 636 color, flatbed scanner, aimed at home and small-office/home-office users, offers an optical resolution of 600 dots per inch (dpi) and one-touch scanning for $299. In addition, users can customize buttons to perform scanning functions through a software interface and easily set up the machine using a basic setup guide included with the scanner (800/463-7766, 310/782-2600, http://www.epson.com).

▶ At only 2 inches high and 14 inches wide, the 9.9-pound ME NPII/266 multimedia notebook from Micro Express (ME) is designed with the sales professional in mind. Priced at $3,499, the unit comes with an Intel 266 megahertz (MHz) Pentium II processor, 64 megabytes (MB) of random-access memory (RAM), a three gigabyte (GB) hard drive, and a 15.1-inch active-matrix display. In addition, ME's notebook includes a 24X CD-ROM drive, a video card with 4MB of memory, a 56 kilobits-per-second (Kbps) fax/modem, Windows 95, and a Lithium-ion battery (800/989-9900, 714/852-1400, http://www.microexpress.net).

▶ Weighing less than 7 pounds, the new 700 ANSI lumen LP 425 projector from In Focus features a 40% increase in brightness over the company's previous LP 420 model. The $5,999 data/video projector offers Super Video Graphics Array (SVGA) at an 800 by 600 resolution, a contrast ratio of 400:1, advanced video capabilities, and a maximum diagonal screen size of 15 feet. Designed for the mobile professional, the LP 425 can project everything from business presentations to training videos through Texas Instruments' newest Digital Light Processing technology, providing extra bright color displays (800/294-6400, 503/685-8888, http://www.infocus.com).

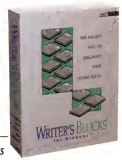
▶ Protecting expensive hardware is a concern for almost everyone who owns a computer. POWERMAX has increased the safety provided by the company's mid-level family of surge protectors, providing a $100,000 warranty on properly connected equipment, a fourfold increase from previous offerings. Units affected by the enhanced warranty include the POWERMAX TEL for computers with modems, faxes, or telephones;

POWERMAX SIX

POWERMAX ISDN for combined AC and high-speed Integrated Services Digital Network (ISDN) lines; and the POWERMAX SIX for AC-only applications. In addition, the company is still providing its standard lifetime product guarantee on all its surge protector products (800/472-5555, 415/499-3900, http://www.panamax.com). ■

Software

Armed with the new *Java Shared Data Toolkit* from Sun Microsystems Inc., developers can generate applets and applications as well as create network-central operations such as chat rooms, shared whiteboards, remote presentations. Quick and easy to download from the company's Web site, the $99 development library software is fully compliant with Sun Java standards (888/843-5282, 512/434-1591, http://java.sun.com/products/java-media/jsdt). ▶ *Writer's Blocks 2.0* from Ashley Software is designed to make organizing and composing stories a less frustrating experience. The $99 application works behind the scenes to automatically arrange, renumber, size, and center a writer's input for easy manipulation later. Ashley Software offers a copy of Writer's Block through the company's Web site for a free 30-day trial, as well as upgrades from earlier versions for $59. The 32-bit software application requires a 486 PC or higher, 16 megabytes (MB) of random-access memory (RAM), 17MB of available hard drive space, and Windows 95 or NT (800/229-6737, 714/583-9153, http:// www.writersblocks.com). ▶ Aimed at Web designers, SPG Inc.'s *WEB Tools Web Graphics Plug-in Suite 4.004* comes with several features to ease page design. The suite's Batch Banner Image Merger enables designers to merge a banner image to groups of images, while the Batch Image Watermarker allows for watermarks to be implanted on groups of images. In addition, the application's WEB Slideshow Builder automatically generates HTML pages, JavaScript code, and navigational structure for slideshow presentations. A demonstration version of the $199 suite can now be downloaded from the SPG Web site (305/362-6602, http://www.spg-net.com). ■



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*For users of the Windows® 95 or higher operating systems only. Includes MSN Internet Access client access software only. One month free unlimited trial is available to new members of MSN Internet Access in the 50 United States and the District of Columbia only. A credit card is required. Local phone and/or long distance toll charges may apply. Local market network activity and capacity may affect access ability. Offer expires June 30, 1999. **As validated by Inverse Network Technology, July 1998 (www.mynetnet.com).

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Share The PC Power

Gone are the days of having to wait for roommates or family members to finish surfing the World Wide Web so you can start on an important report. With Applica's U2, two people enjoy the convenience of working simultaneously on one computer.

The Applica U2 consists of an expansion card that plugs into your PC and a small connector box that has ports for attaching a second monitor, keyboard, and mouse. The U2 package also includes software that takes advantage of the multitasking power of Windows 95. You must purchase the second monitor, keyboard, and mouse separately. The second user can share the main computer's printer and CD-ROM drive, but the U2 station doesn't support sound.

The U2 can make Internet access more convenient, letting two people use the 'Net at once with one modem, phone line, and Internet connection. But remember that the equipment that normally serves one user is now handling two, so both users will experience lower performance if they're accessing the Web simultaneously or one is downloading a file. One of U2's best 'Net uses is to let one person go online while another runs non-Internet applications.

The $249 U2 works by redistributing unused PC power to the second user. Therefore, the faster and more powerful your main PC is, the easier it will be for both users to operate different applications quickly and effectively.

Concurrent Controls Inc.

(800) 487-2243
(415) 873-6240
http://www.applica.com

Dave Fata

Another Comfy Cat

Power Cat

Cirque's products such as the Power Cat touchpad have helped prove that the mouse is dispensable. Now Cirque is giving mice and mainstream keyboards a scare at once. The Smooth Cat combines a contoured keyboard and a multifunction touchpad that assumes the duties of a mouse.

The touchpad located on the keyboard's right side, below the four directional arrow keys, lets users simply slide a finger to do everything they'd normally do with a mouse. To click an icon, users tap a finger on the touchpad. To double-click they tap twice, and dragging, drawing, scrolling, or highlighting require tapping and holding the finger down. To easily zoom in and out of documents, users just slide their fingers along the touchpad's left edge.

The touchpad is an excellent substitute for those who find using a mouse painful or difficult due to arthritis or other disabilities.

The sloped keyboard discourages wrist strain, and having the touchpad so close reduces the effort of continuously reaching for a mouse. The $89.99 Smooth Cat is definitely a product designed for comfort and ease-of-use. Another Cirque product available later this year will let users assign commands by drawing simple symbols on a touchpad.

Cirque

(888) 868-2490
(801) 467-1100
http://www.cirque.com

'Net Audio Wherever You Go

Audible's MobilePlayer is one of those gadgets that turns a great idea into a great *practical* idea. The vast amounts of audio available on the Internet are an impressive resource, but listening in the past was confined to sessions at the desktop PC. The MobilePlayer lets users download 'Net audio and take it with them.

Audible offers thousands of hours of spoken audio, from the latest bestsellers to business and technology reports. Programs (more than 4,000 are available) cost from 95 cents to $9.95. Mobile-Player owners can download programs onto the device and play them back whenever and wherever they wish—during their daily commute, while exercising, or while on a long flight. Audio plays through headphones or a cassette adapter in a car stereo.

Once users download a program, it stays in their account history for repeated downloading at no charge.

The 3.5-ounce MobilePlayer can store up to two hours of Internet audio. Users can download longer programs onto their PCs, then download portions of them onto the MobilePlayer as needed. Bookmarks help listeners keep track of where they're at in a program.

For $199, customers get the MobilePlayer and the necessary accessories from Audible. For $249, Audible will throw in a credit for $75 worth of audio programs.

RealNetworks has partnered with Audible to offer RealAudio files, which can be downloaded from equipped Web sites or from a company's **intranet**, an internal network that works like the 'Net. Business travelers can now download recordings of important business announcements or conference calls and listen to them at their convenience.

Music fans looking forward to downloading the latest hit from the music charts will be disappointed at the Audible store. Audible says it can't offer music because the music files would be too large and the MobilePlayer would hold only five minutes of sound.

Audible Inc.

(888) 283-5051
(973) 890-4070
http://www.audible.com

An Organizer For Your Organizer

Sometimes organizational programs such as *Microsoft Outlook* seem to be more of a nuisance than an aid, cramming one more confusing, and often neglected, program onto our hard drive.

Actioneer Inc. is attempting to change all that with an application developed to simplify the use of programs such as Outlook and transform them into true time savers. *Actioneer* lets users double-click an icon on the toolbar to create a small, pop-up window called an Action Note, which consists of an Action Note Window and a Shadow. Without opening Outlook, Actioneer identifies where the information needs to go, links it to Outlook through the Shadow, and files it in the appropriate place within Outlook.

Actioneer knows where to place information by recognizing keywords (both default words and those users enter) that link to the sections within the Shadow window.

Let's say someone types, "Meet with Bill Jones tomorrow at 3:00 to discuss business venture." Actioneer recognizes the keywords "tomorrow" and "3:00" and displays the appropriate date and time in the Date and Time section of the Shadow. The Shadow will also display "Bill Jones" in the Contact section and "Business" in the category section. The next time the user opens Outlook, all the data will be filed away in the appropriate places and under the correct categories.

Instead of saving E-mail messages as reminders, users can cut and paste the message into Actioneer, which then sends the message to Outlook. Users can delete the message from the Inbox immediately and avoid clutter.

Actioneer works with other organizer applications including *Lotus Notes 5.0* and *Palm Desktop*. Actioneer for the PC costs $39.95, and Actioneer 2.0 for Palm Pilot is available for $19.95. Both are available at the Actioneer Web site.

Actioneer Inc.

(800) 942-4044, (415) 536-0700
http://www.actioneer.com

Playin' With Colors & Keys

Have you ever become torpid while plugging away in DOS, lulled by the mesmerizing cursor slowly blinking on the cavernously black DOS screen? Perhaps, not. But if you've at least wished for a little fun and a splash of color, DOS has a device driver for you. Ansi.sys, packaged with MS-DOS, is a driver that communicates with your keyboard and your color display.

Never play guessing games or hunt and peck your way through Ansi codes; it could rewrite your hard drive. Instead, use a few of the codes listed below to get started. Check the appendix in your DOS manual for the Ansi Command Reference list of numeric values you'll use in making adjustments.

Code	Result
$b	| (pipe or bar)
$d	current date
$e	escape
$g	>
$l	<
$$	dollar sign
$t	current time
$p	drive & path
$v	version of DOS
$	q=

Figure1: Use the code on the left to produce the desired prompt on the right.

Load It Up

Ansi.sys comes with all MS-DOS versions after 2.0, so loading it is simply a matter of editing your Config.sys file. You'll need about four kilobytes (KB) of free memory; if you don't have that much, your system probably isn't running anyway. Enter the following command into your Config.sys file, substituting the correct letter for your drive in place of C:. For example, **device=c:\dos\ansi.sys/x**.

(NOTE: If you have a 101-key keyboard, the /X switch enables DOS to recognize different codes for keys with the same function. If you want your 101-key keyboard to function as an 84-key keyboard, end your command with /K instead of /X in all our examples.)

This will load Ansi.sys into your conventional memory. If you have Emm386.exe in your Config.sys file, load Ansi.sys into upper memory by entering: **d e v i c e h i g h = c : \dos\ansi.sys/x**.

After saving the changes to your Config .sys file, exit the file and reboot the PC.

PROMPTly

Let's start with some simple programming that will alter the appearance of your DOS prompt. If you inadvertently key in a sequence that gets rid of your prompt entirely, the code to reinstate the C> prompt is: **prompt=pg**. These commands all begin with prompt=. This structure is necessary to produce any of the changes in Figure 1.

Add a little color to DOS by changing the color of your prompt and screen. Enter the following line: **prompt=$e[31;42m$p$g** to see a red prompt over a green background box. Enter **cls**, and your entire screen turns green, and the prompt moves up into the left corner of the screen.

The structure of the preceding code is important. Prompt determines the command; "$e" is the escape code that begins the sequence; "[" tells the computer to execute what follows; "31" is the code for the prompt or text color red; "42" is the code for the background color green; and "m" is the **terminal character**. The terminal character tells the computer to stop executing the program sequence. See Figure 2 to substitute a different color for red or green.

Change Those Keys

There is a numeric value assigned to each key on your keyboard, and you can use the Ansi sequences to reassign those key functions.

First, go to DOS Edit by typing **edit**. Then, open a new document (press ALT-F, *N*). Save it (ALT-A), and name it as a batch (.BAT) file, Test.bat, for instance. Then, key in the following using CTRL-P and ESC to insert the arrow symbol (←), which may also show up as ←. To assign the command DIR <enter> to the F3 key, you would type: **ECHO ← [0;61;"DIR";13p**.

The lower case "p" is the terminal character in the sequence, and it must accompany every line of code you write. Go to File, Save, and Exit. At the C> prompt, type **test** or the name of your batch file. When you reboot the computer, F3 will return to its original function. Add the name of your batch file to your Autoexec.bat file to use your new key assignment each time the PC starts up.

These are just a few of the little tricks you can perform with DOS after loading Ansi.sys. ■

by Katie Dolan

Color	Prompt & Text	Background
Black	30	40
Red	31	41
Green	32	42
Yellow	33	43
Blue	34	44
Magenta	35	45
Cyan	36	46
White	37	47

Figure 2: To alter the color of your prompt and screen use this code.

Meet The Applications Group

If you think Captain America has a great team of heroes, check out the powerful gang in Windows 3.1's Applications group. If you want to defend your PC from a suspected virus, improve performance, or restore a file you accidentally deleted from your system, the Applications group is probably your most valuable resource.

Applications

The group's contents vary from system to system, but you'll always find standard utilities including Microsoft Anti-Virus (MWAV), Microsoft Vsafe (MSAVTSR), Microsoft Backup (MW BACKUP), Microsoft Undelete (MWUNDEL), SmartDrive Monitor (SmartMon), Microsoft QBASIC, and the MS-DOS editor. Let's look at what these standard applications do.

Windows 3.1 has a plethora of useful programs in its Applications group. The Applications group's contents vary from system to system, but always include Microsoft Anti-Virus, Microsoft Backup, Microsoft Undelete, Microsoft QBASIC, and MS-DOS Editor.

Microsoft Anti-Virus (MWAV) & Microsoft Vsafe Manager for Windows (MSAVTSR). This pair of antivirus applications checks your system for malicious files that may have infected your PC. The Anti-Virus application checks your system for viruses and creates a summary report for viruses found since the last time you ran a virus scan. To deploy a virus seek-and-destroy mission, open MWAV and then the directory or diskette you want to scan. To see a list of the viruses Anti-Virus can find, click the Scan menu and select Virus List.

Vsafe is a **terminate-and-stay-resident (TSR)** program for DOS. (TSR programs load into memory when your PC starts up but don't show themselves until you select and open the program.) To run Vsafe every time you start Windows, drag the icon to the StartUp group and reboot your PC. When the Vsafe window opens after you reboot, you can minimize the window.

For the best antivirus protection, you should install a current antivirus program such as *Dr Solomon's Anti-Virus* or *F-Prot Pro* from Command Software Systems Inc.

Microsoft Backup (MW BACKUP). The Backup function copies files from the hard drive to another location, ensuring safety for archiving files and transferring data. You can opt for Full backup (all files), Incremental backup (files that have changed since the last backup, plus all previous versions), or Differential backup (any new or modified files since the last backup). Compare pits the backup files against another set of files and looks for matching files. If you lose your original file or directory, Restore recovers the copied backup data and sends it to a specified drive. Configure reviews the program settings for Backup, and lets you change these settings at will.

Microsoft Undelete (MWUNDEL). Undelete recovers deleted files and directories from Windows 3.1 and MS-DOS applications. To search Windows 3.1's list of deleted files and directories, click the Find button, select the file by name, and then click Undelete.

Any files labeled Poor or Destroyed are grayed out and cannot be recovered with Undelete. Undelete lets you choose the type of file recovery it performs. Standard doesn't ensure complete file recovery, and it requires you to provide the first letter of the file name. Delete Tracker searches for the complete file name of a deleted file. Delete Sentry ships deleted files to an invisible directory. To select a delete protection option, select Configure Delete Protection from the Options menu.

SmartDrive Monitor (SmartMon). SmartMon provides a view of your SmartDrive **cache** (memory reserved for quick access to frequently used data), and allows you to change the way your PC's drive cache works.

To view or alter the contents of your cache, see the Cache Memory Control group, which controls the size of your cache under DOS and Windows. The Reset button tells SmartDrive to send the cache's contents to a disk and then discard the cache elements.

Through the Drive Controls, you can view the elements of that particular drive's cache. Furthermore, this is the place where you can change the way your cache works, choosing from Cache Read Only, Cache Read and Write, and No Caching.

The other elements of SmartMon are the Cache Hit Rate Chart and the Iconic Display, both of which represent how much of the cache you're using.

MS-DOS Editor. This icon represents the main MS-DOS-based, word-processing program. When you double-click this icon, Windows 3.1 shuffles you directly into the application in MS-DOS mode. From here, you can create word-processing documents.

Microsoft QBASIC. This icon provides access to a program in which you can create your own programs using the QBASIC programming language. ■

by Kay Prauner

Customizing Desktop Icons

Admit it: Application icons are useful, but boring. It is easy, however, to add a little personality and flair to your Desktop by changing these icons.

Existing shortcut icons are simple to change. You'll know a shortcut by its small arrow on the left side of the icon. (*NOTE: If the Desktop icon you are changing is not a shortcut, the following method will not work. For example, you cannot change the My Computer icon using this method. You can, however, create a shortcut to My Computer by right-clicking the My Computer icon and selecting Create Shortcut. Then use the method below to change the shortcut's icon.*)

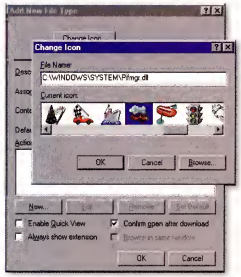
If you already have shortcut icons on your Desktop, right-click an icon and select Properties from the resulting pop-up menu. A window detailing the icon's properties will appear. Select the Shortcut tab (or the Program tab if your shortcut points to a program rather than a data file) and choose the Change Icon button.

When you install a new application the installation often includes a variety of icons for that application. If the application whose icon you are changing has other icons available, a window with those icon options will appear when you click the Change Icon button. You can choose an icon from this folder or you can use the Browse button to locate another folder on your hard drive containing other icons. Once you locate the icon you want, simply select it, click OK, and then click OK again. Your new icon will immediately appear on the Desktop.

Using My Computer

You'll find another simple way to change icons for applications and types of files in My Computer. Launch My Computer, open the View menu, and then choose Options. In the resulting window, select the File Types tab. From the list of Registered File Types, choose the type of file for which you want to change the icon. Click the Edit button to open the Edit File Type window. Click the Change Icon button at the top of the window to display the Change Icon dialog box.

If your system has other icons available for this file type, the folder in which they reside will appear as the default folder. You can select one of these icons or use the Browse button to locate other icon folders with funky icons. Look in the C:\WINDOWS\SYSTEM folder for the Shell32.dll and Pifmgr.dll files. They contain a variety of icons from which you can choose. When you locate your chosen icon, highlight it and click OK. When you finish, click Close to exit the Edit menu and then click OK in the Edit File Type window.



The Pifmgr.dll file in the C:\WINDOWS\SYSTEM folder provides Windows 95 users with some creative icon options.

Icon Font & Spacing

For further customization of your Desktop icons, right-click an open area on your Desktop, select Properties from the resulting pop-up window, then select the Appearance tab. Look for the Item bar and select Icon from the drop-down list. Use the Size and Font menus, as well as the Bold and Italic buttons, to change settings and create the perfect look. You can immediately see your changes by clicking the Apply button. Be sure to change settings back if you don't like the new arrangement; the Cancel button does not overwrite applied changes.

Locating Icons

If you're still unsatisfied with your icons and want something a little more funky or theme-oriented, such as characters from a movie, television show, or video game, your best bet is to look to the Internet to find these icons. A couple of good World Wide Web sites to check out are WinFiles.com at http://www.winfiles.com/apps/98/icons.html and Iconcity at http://yoink.com//iconcity. If you don't find what you're looking for there, use a search engine, such as Excite (http://www.excite.com), to uncover some of the more obscure sites that offer icons.

Once you find the icons you want, download them and place them on your hard drive. It doesn't matter where you store them on your hard drive, but we recommend creating a new folder called ICONS so you can easily find them when you want to select a file from the Browse button.

So what are you waiting for? In only a few minutes you can change your boring computer Desktop into an entertaining delight that reflects your personality. ■

by Meredith Witulski

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Diskette Formatting

Did you buy some diskettes that did not come pre-formatted? Want to clear off an old diskette? Maybe you're just trying to make some use of those stacks of free America Online diskettes. In any of these situations, you probably need to format the diskette. Formatting wipes out any files on a diskette, making it quicker than manually deleting all its files. Better yet, you can make sure that any bad sectors on the diskette are restricted so that files aren't saved onto the bad sectors. At some point, you may need to format your hard drive, typically when you're constantly getting read/write errors, corrupted files, and frequent crashes. You should only format it as a last resort, though. Try fixing it with ScanDisk first (described below) and backup as many files as possible from the hard drive to diskettes or a backup drive.

MS-DOS 6.22

FORMATTING A DISKETTE in MS-DOS is simple and easy, type **format** and the letter of the appropriate drive at the C> prompt. For example:

format a:

DOS' FORMAT command includes a few bells and whistles. For example, you can add a switch to the command for a quick format or an unconditional format. You also can have the PC's system files copied to a diskette after formatting it, which will make it a **bootable diskette** you can use in case your computer won't start up.

To do a quick format, add the /Q switch to the command:

format a: /q

A quick format merely deletes a diskette's catalog, also called the **file allocation table** (**FAT**), which keeps track of where files are on the diskette. The catalog makes it quick and easy to retrieve files and keeps new files from saving over old ones. You shouldn't use the quick format option on diskettes you are having problems with because it doesn't check for and fix errors.

An unconditional format, however, will check and fix errors. It deletes everything on a diskette, including the catalog. While clearing the diskette block-by-block, it also checks for errors. It will note any bad blocks in the new catalog, preventing new data from being saved onto bad areas. Because unconditional formatting performs more than a quick format, it will take a few minutes to complete. To do an unconditional format, add the /U switch to the format command:

format a: /u

Simply typing **format a:** will do a format that is a cross between an unconditional and quick format. It will "verify" a diskette, checking it for bad blocks without erasing the entire diskette. It will note the bad blocks in the catalog, but it won't erase anything but the old catalog.

To copy the system files to a diskette, add the /S switch to the format command. To name a diskette, type ***/v:name*** at the end of the command (for example, **/v:disk1**). You can put several switches together, as in this example:

format a: /q /s /v:bootdisk

A few caveats: Diskette names can't exceed 11 characters, and you need to make sure a diskette is unlocked before it is formatted. To make sure a diskette is unlocked, flip it on its back (a metal circle should be facing up) and make sure the tab in the top-left corner is blocking the window. If you need to, push the plastic tab down to close the window.

Windows 3.x

LAUNCH FILE MANAGER, which is located in the Main program group. Once File Manager is open, select Format Disk from the Disk menu.

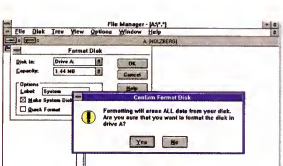
First, confirm the capacity of your diskette. It should be **high-density** (**HD**), 1.44 megabytes (MB), but if you have an older, **double-density** (**DD**) diskette, it will only hold 720 kilobytes (KB). If you can't tell whether you have a DD or a HD diskette, an HD diskette should have an HD logo somewhere on the diskette. If not, place the diskette on its back (the circular piece of metal should face up) and look for a small, square hole in the top-right corner of the diskette. If there is no hole, it's a DD diskette. Selecting the right capacity is important because if you try to format a DD diskette as a HD diskette, you will receive an error message and the diskette will not format. If you format an HD diskette as a DD diskette, you will waste space.

After you have the right capacity selected, insert the diskette in the drive. If you want to name the diskette, enter the name in the Label field. If you want to make the diskette a system (or bootable) diskette click the Make System Disk box.

If you're formatting a diskette that already has a format and works without problems (for example, no "disk error" messages when you read from or write to the diskette), click the Quick Format box to speed up the format. If you have a

previously formatted diskette or a diskette with disk errors, you need a full format to find and block bad sectors, so do not click the Quick Format box.

Once you select the options you want, a name, and the correct capacity, click OK to begin formatting the diskette.



Windows 3.1 will give you a warning message before it will begin formatting a diskette.

Windows 95/98

FIND YOUR DISKETTE drive's icon by double-clicking the My Computer icon on your Desktop. Insert the diskette you want to format, then right-click the diskette drive icon and select Format.

Once the Format window opens, confirm the capacity of your diskette in the Capacity field. It should be 1.44MB, but if you have an older DD diskette, it will only hold 720KB of information. (*NOTE: If you can't tell whether you have an HD or DD diskette, see the Windows 3.x section above.*)

Next, move to the Format Type field. If you're formatting a previously formatted diskette, click the Quick (erase) radio button to speed up the formatting process. Diskettes that aren't pre-formatted or that have errors need a full format, so click the Full radio button. This will set up the diskette for use and find and block bad sectors, keeping data from being written to them .

If you just want to copy the system files to the diskette without formatting it, you can make the diskette bootable by clicking the Copy System Files Only radio button. If you want to make a system diskette but you need to format your diskette first, click the Quick or Full format buttons, then select Copy System Files under the Other Options section.

You also can name the diskette by entering a name in the Label field. To skip the end summary, which tells you how much space is available on the diskette and how much is space is taken up by bad sectors and by system files, uncheck the Display Summary When Finished box.

Once you select the options you want, click the Start button to begin formatting the diskette. After the formatting is complete, the window will remain open in case you want to format more diskettes. If you do, enter a new name in the label field (if needed) and click Start again. Otherwise, click the Close button.

Copying Diskettes

There *is* an easy way to copy data between two diskettes on PCs with a single diskette drive, and it's not manually copying the contents of the diskette to the hard drive, then to another diskette. DOS, Windows 3.x, Windows 95 (Win95), and Windows 98 (Win98) all have options that take the grunt work out of copying diskettes.

MS-DOS 6.22

COPYING DISKETTES IS FAIRLY straightforward with DOS' DISKCOPY command. Simply type the command, followed by the drive letter for the source diskette (the diskette to be copied) and the drive letter for the target diskette (the diskette to copy to) at the DOS prompt. For example, if you have only one 3.5-inch diskette drive, you would type:

diskcopy a: a:

and press ENTER. DOS then prompts you to insert the source diskette and press the ENTER key. The source diskette is copied to the hard drive and then a prompt tells you to insert the target diskette and press any key to continue. DOS then copies the files to the target diskette. After you finish making copies of that source diskette, you can copy a different source diskette or exit back to DOS.

To be certain the diskette has successfully copied, add the /V switch to the DISKCOPY command like this:

diskcopy a: a: /v

This will verify the target diskette to make sure there were no errors copying the files. This is a good idea if you're transferring important files to a backup diskette because you don't want to take a chance that the data on it had been corrupted.

Windows 3.x

TO COPY DISKETTES IN WINDOWS 3.X, open File Manager (which is in the Main program group). Then, select Copy

Disk from the Disk menu. DOS will then give you a warning: This Operation Will Erase ALL Data From The Destination Disk. Are You Sure You Want To Continue? Click Yes. Next, DOS will prompt you to Insert Destination Disk. Insert your diskette and click OK to start copying.

Unfortunately, Windows 3.x doesn't let you make multiple copies of the same diskette without having to keep rereading the source diskette. If you need to do that, go to Program Manager and select the Exit Windows command from the File menu. Then follow the directions in the DOS section above to use DOS' DISKCOPY command, which will read the diskette once, but write as many copies as you want.

Windows 95/98

DOUBLE-CLICK THE MY COMPUTER ICON on the Desktop and find the 3 ½ Floppy (A:) diskette drive icon. Insert the diskette you want to format, then right-click the diskette drive icon and select Copy Disk.

If you're like many computer owners and have only one diskette drive, you'll see a dialog box explaining that the computer will copy from the A: drive and write to the A: drive. If you have a second diskette drive that can handle diskettes as large as the one you're copying, select the second drive. Otherwise, just click the Start button.

The computer will read the source diskette and then display a message saying, "Insert The Disk You Want To Copy To (destination disk), And Then Click OK." After you've done that, and the copy is complete, click Close.

Unfortunately, Win95 and 98 don't let you make multiple copies of the same diskette. If you need to, go to the Start menu, open the Programs folder and launch the MS-DOS prompt. Then follow the directions in the DOS section above to use DOS' DISKCOPY command, which will read the diskette once and let you make as many copies as you want.

Using ScanDisk

ScanDisk checks hard drives and diskette drives for errors and, if necessary, corrects them. If you're having trouble reading from or writing to a diskette, this invaluable tool may solve your problems. It's also good preventive maintenance to periodically check your hard drive for errors with ScanDisk.

MS-DOS 6.22

SCANDISK IS EASY TO USE in MS-DOS; simply type **scandisk** and the letter of the drive to scan. For example:

scandisk a: or **scandisk c:**

When launched, ScanDisk checks the specified drive's file structure, making sure there are no missing files and that a diskette's catalog is in good shape. While it will detect and fix errors caused by a corrupt diskette catalog (catalogs can be corrupted by system or program crashes), it doesn't check the actual surface of your diskette or hard drive for errors unless you tell it to run a surface scan.

This is why you need to run a regular scan and then a Surface Scan (when prompted) on your hard drive and diskette drive. If you don't, areas on the surface of your hard drive or diskette could eventually develop errors, which would no longer allow data to be reliably stored there. So, after checking the file structure of a disk, always run a Suface Scan when ScanDisk prompts you. This could take a while, but it's worth the time because any bad sectors of the disk you're checking will be blocked from future use, meaning it's less likely files you save will be corrupted.

If ScanDisk shows you the Problem Found dialog box, it will explain the problem in the scanned drive and explain what will change if you fix it. To correct the problem, select the Fix It button. You also can select the Don't Fix button to skip the problem and the More Info button to find out more about what will happen if it isn't fixed.

After ScanDisk finishes, you have the option of viewing the log or exiting. ScanDisk alerts you to errors during the scan process, so there is really no new news in the log file. It's handy if you want a quick review of what ScanDisk found, but otherwise, you might as well just exit back to DOS.

ScanDisk offers a few other options. If you want it to check all local drives, add the /ALL switch to the end of the ScanDisk command, as in the following:

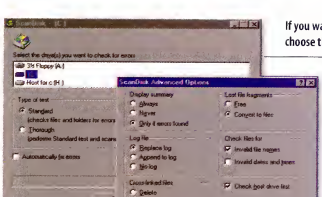
scandisk /all

This command will check any diskettes and any hard drive partitions. Another option is to add the /AUTOFIX switch, which will take you out of the decision-making loop. Instead of asking you whether you want to fix a particular error, ScanDisk will automatically correct the problem.

Windows 3.x

WINDOWS 3.X USES THE DOS VERSION OF SCANDISK. SEE the instructions above.

Windows 95/98



If you want control over how ScanDisk works, choose the Advanced button in Windows 95.

IN WIN95 AND 98, launch ScanDisk by opening the Start menu, then Programs, Acce-ssories, System Tools, and finally ScanDisk. Once the program launches, you can select which drive or drives to search. By default, ScanDisk will select the hard drive. If you want to check a diskette instead, click the diskette icon. If you want to check more than one drive at a time, hold down the SHIFT key and click the drive icon.

Next, decide whether you want to do a Standard or Thorough test. A Standard test checks only the drive's file structure, making sure there are no missing files and that its catalog, or FAT is in good shape. The test take a minute or two to complete, but it will only detect and fix errors caused by a corrupt catalog (catalogs can be corrupted by system or program crashes). It doesn't check the actual disk surface for errors. Eventually, areas on the surface of your hard drive or diskette will develop errors and data can no longer be reliably stored there.

To check for such errors, do a thorough test, which will perform a scan of the disk's surface. This will probably take 15 to 20 minutes if you have a large hard drive (around two gigabytes and larger). It's well worth the time because any bad sectors of the diskette you're checking will be blocked from future use, meaning it's less likely files you save to the hard drive will be corrupted.

If you want the computer to make the decisions for you, click the Automatically Fix Errors box. If you don't want to customize ScanDisk, go ahead and click the Start button to begin the tests.

If you want control over how ScanDisk works, however, click the Advanced button instead. You'll see about five options. One will ask whether you want to display a summary after ScanDisk finishes. By default, Always is selected, but Only If Errors Found would probably be the best bet. That way you have one less screen to look at and one button to push before exiting back to Windows. If you pay close attention to what errors ScanDisk notes, you may want to turn the summary off by selecting Never.

The Log File options lets you replace the log from the last time ScanDisk ran, append to the last log, or not create a log. The first two options are the best. If you have trouble later, you always can refer to your ScanDisk log to see if it's a recurring problem. That may be useful information if you're trying to explain hard drive or diskette problems to a technical support consultant.

The Cross-Linked files option is more complicated. **Cross links** occur when two or more files are using the same spot on the hard drive. Making copies will ensure that all the files have the information contained in that spot on the hard drive. That's the best option, and the default. Delete will delete any cross-linked files, while Ignore will ignore them, which later could lead to diskette errors.

The next options are in the Lost File Fragments section. Lost file fragments are created when a file is removed from the diskette's catalog, allowing new information to be stored on top of it. If the new files are smaller than the old file, fragments of the old file will remain on the hard drive. You won't see them in Windows, but they are still on the hard drive. If you are trying to recover lost files (files that you accidentally deleted or that somehow disappeared), leave the default, Convert To Files, selected. Otherwise the fragments, and the data they contain, will be deleted.

If you're having trouble reading from or writing to a diskette, ScanDisk may solve your problems.

The last options customize how selective ScanDisk is, telling it whether it should also fix files with invalid file names, dates and times, and duplicate names. The first two options are good ideas, but you probably have a few files that have the same name, which is probably just a coincidence and not a disk error. So you will probably want to leave off that last option.

After you customize ScanDisk to your liking, click OK, and then the Start button. If ScanDisk finds an error, it will tell you what it is and why your should fix it. Then, you need to select whether you want to fix, ignore, or delete the problem. We suggest fixing the problem. ■

by John Lalande

Is Windows 98 Worth It?

Jason Cole

Rumored Headaches Cloud The Upgrade Question

IT'S TOUGH TO GET "Heat Seekers," or PC performance nuts, away from their PCs, but many of these users left their machines long enough to line up at midnight June 25 for the debut of Microsoft's new operating system, Windows 98. From the release day through July 17, more than 1 million copies of Windows 98 (Win98) danced off retail shelves, according to PC Data. Although these figures are impressive, users haven't given their praise to Win98 as easily as they gave their money, and business users appear to be sitting this one out completely. Opinions on Win98's performance vary depending upon whom you ask.

If you're unsure about upgrading and feel lost among conflicting reports, stick around. We'll tell you which features have perturbed and delighted intrepid users who've gone before you. As a business user, you, too, may be debating the benefits of upgrading to Win98; we'll tell you what a few network engineers have to say about Win98 in the workplace.

Remember that if you purchase a new PC with Win98 preloaded you shouldn't encounter the same problems as users who upgrade to the new operating system. The problems discussed below are the result of upgrading to Win98.

Fewer Calls For Help

Microsoft says that Win98's rollout has gone extremely well from the users' perspective. During the 30 days following Win98's release, the Telecommunications Research Group (TRG) conducted a survey for Microsoft and found that nine out of 10 buyers of the a Win98 upgrade license reported satisfaction with the product. In addition, calls to the Win98 technical support line are roughly half of those generated after the release of Windows 95 (Win95), which indicates far fewer problems with installation and use of the new operating system. TRG found 72% of those surveyed thought Win98 was easier to install than Win95.

A Microsoft spokesperson says the tech support calls are evenly distributed among three categories: "How Tos" about specific tasks or features, troubleshooting installation problems, and conflicts with hardware and **device drivers** (software that controls hardware).

One of the most popular how-to questions concerns converting hard drives to the more efficient FAT32 storage system. Once Win98 is installed, users can go to Start, Programs, Accessories, System Tools, to choose a utility called Drive Converter that allows a one-click conversion. For details on this process, see "Using FAT32" in our October 1998 issue.

Half of all calls to tech support regarding Win95 were installation problems, the spokesperson says. Microsoft did extensive beta testing to take the pain out of installing Win98, and, consequently, there are about 30% fewer callers with installation problems with Win98 than with Win95. Calls to tech support concerning installation problems have generally been the result of users forgetting to check for enough disk space or neglecting to disable utilities before installing Win98. For instance, Win98 won't install with an antivirus program running in the background. Right-clicking an antivirus

program's icon and selecting Close should take it out of commission while you install Win98.

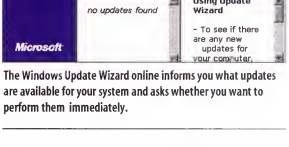
A small percentage of callers with installation problems have expressed difficulty upgrading from Windows 3.1. Microsoft successfully tested the upgrade from 3.1 to 98, but some users try to slide into Win98 with a PC that doesn't meet the system requirements. The upgrade probably won't work with PCs that come up short of Win98's requirements in areas such as processor speed and hard drive space.

Bittersweet Upgrade

Users have mixed emotions about Win98. For instance, Steve Elliott of Siebe Environmental Controls in Rockford, Ill., says Win98 runs significantly more slowly on his 100 megahertz (MHz) Pentium PC than Win95 did (Microsoft recommends at least a 66MHz processor for Win98). He says his system was running smoothly and opening files quickly, but Win98 dramatically slowed things down. He tried to speed things up by turning off all the visual enhancements and changing his folder viewing from World Wide Web style back to Classic, but he says he still noticed little improvement. Disabling the Web browser for better performance is a drastic step since one of Win98's most-touted enhancements is its integration with the *Internet Explorer* browser, giving the entire Desktop a Web-style appearance.

On the other hand, Elliott did find Win98 topping Win95 in several areas. For instance, he says Win98 has a better hard drive **defragmenter** (which reorganizes and rewrites files in a more efficient manner) and a few really good clean-up utilities. Elliott also had success with the much-anticipated Universal Serial Bus (USB) support, which is designed to automatically recognize and configure new hardware. He says he loaded a USB mouse without rebooting the PC. That simple fact represents a vast improvement over the sometimes torturous hardware configurations in older Windows versions.

Dan Behannon, director of networking for Sitel Corp. in Omaha, Neb., says he found Win98 simple to install and is thrilled by the FAT32 conversion. He says before installing Win98 on his home computer, he had 200 megabytes (MB) of free hard drive space. After installing Win98 and converting the hard drive, he was amazed to find nearly 400MB free. On the other hand, he thinks that Win98 is mostly fixes for **bugs** (program flaws) in previous versions of Windows and that Microsoft shouldn't charge so much for fixing its errors.


Microsoft Windows Update Wizard - Microsoft Internet Explorer
Update Wizard
Update
Restore
The following updates are available for your computer. To install an update, click it in the list
Rescan
Available Updates
Description
no updates found
Using Update Wizard
- To see if there are any new updates for your computer,
Microsoft

The Windows Update Wizard online informs you what updates are available for your system and asks whether you want to perform them immediately.

In the postings of Internet newsgroups, one of the best places to quickly check the feelings of users, a prevalent complaint is that Win98 replaces some shared system files (Dynamic Link Libraries with the .DLL extension) and drivers it doesn't recognize with older versions. Microsoft's spokesperson says Win98 shipped with 1,200 new drivers, but not all hardware vendors have had a chance to update legacy hardware. Microsoft is currently working with vendors to ensure that customers get updated drivers as soon as possible. You can check what hardware is compatible with Win98 at http://www.microsoft.com/hwtest/hcl. If your hardware is not on the list, check the Web site for the product manufacturer to see if you can download a compatible driver.

The problem of shared system file replacement is fairly serious since it renders affected hardware inoperable. The problem results from Microsoft's efforts to help users. During Win95 installation, many users were presented with confusing choices when version conflicts were detected, Microsoft's spokesperson says. Win98 tries to prevent such headaches with a utility called **Version Conflict Manager** (**VCM**). VCM runs during setup and detects potential conflicts between applications that share Windows system files. Upon detecting a conflict, VCM installs the standard Win98 version of the file, which may not be the latest vendor version.

This problem occurs only during setup, so if you install Win98, and all your hardware is working, you're safe. If you have problems, contact Microsoft Tech Support via phone at (425) 635-7222 or online at http://microsoft.com/support. You will need to fill out an online user profile prior to submitting any questions online, while the tech support line requires you to have your product identification number ready.

Prior to upgrading to Win98, visit manufacturers' Web sites to see if your PC will make the transition smoothly. For instance, owners of Dell computers (http://www.dell.com), can go to Support and select the Click Here To See If Your System Can Be Upgraded To Windows 98. After entering your PC's model information, you're told whether your system will support the upgrade and what problems you may encounter. Dell warns that some systems support the upgrade but may not perform optimally. In the case of the OptiPlex GL+ system, the message says Ready To Upgrade Now. Congratulations! Dell even offers a Win98 upgrade user's guide to

help make the upgrade as efficient as possible.

If you've already upgraded to Win98 and are having hardware difficulties, check the Web site of your hardware maker. Hewlett-Packard, for example, has an upgrade suite available on its Web site (http://www.hp.com or http://ww.scanjet.hp.com) for some of its older scanners. If you've had problems with an HP ScanJet 4p after upgrading to Win98, the HP site suggests getting an upgrade kit that includes a new cable and Small Computer Systems Interface (SCSI) card that will make the scanner Plug-and-Play compatible.

Despite these kinds of problems, none of the 20 Win98 users we spoke to wanted to uninstall the operating system. The same feeling prevailed in the newsgroup discussions we monitored. Win98 users, for the most part, want ways to make Win98 work better, not ways to get rid of it.

Get The Groove Back

To correct missteps and offer additional enhancements, Microsoft has set up an online update for Win98 (http://windowsupdate.microsoft.com). This site goes beyond online technical support to actually let users reach improvements by clicking in the appropriate boxes. The site instructs users to go to the Win98 Start menu and open the Windows Update link. The link stores your computer profile and lets the online update inform you about the latest upgrades available, whether you system will support the changes, and what components, if any, you'll need for the upgrades.

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System Service Tag Format
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All Other Dell System Product Lines

PC makers such as Dell post Web sites that help owners tell whether their PCs are ready for Windows 98.

For instance, a buffer overflow error in *Outlook Express*, Win-98's built in E-mail application, makes it the target of an E-mail-based bug that can breach the faulty security and spread rogue code throughout the system. There are now two highly recommended patches available free through the Windows Update link to protect against security breaches.

Windows 98 users, for the most part, want ways to make Windows 98 work better, not ways to get rid of it.

Microsoft's spokesperson is quick to point out that the Windows Update link is not simply a bug fix. There is a number of free enhancement packages available to users who've paid the upgrade licensing fee. One of the most popular downloads is the new Media Player, which supports nearly every available multimedia format on the market. The update link also has Microsoft DirectX 6 available for download. This is another multimedia enhancement package that contains Supplemental Web Fonts, an upgrade package created with Web designers in mind.

Sit This One Out

Sales of more than 1 million upgrade licenses in less than a month make it sound as if Win98 is in great demand, but its dance card is not yet full. Network administrators advise that there is no shame in being a wallflower this time around. Many businesses are waiting for the release of Windows NT 5.0 and are telling employees not to load Win98 on their systems.

Bruce Drenning, network engineer for DPSC Technology Consultants, Baltimore, Md., says upgrading the computers on his company's network would simply be cost-prohibitive. It takes an hour or so to perform each installation, and with 200 computers to upgrade, Win98's enhancements just aren't significant enough to justify the investment of time and money necessary for upgrades. Drenning says his clients will continue to order PCs with Win95 for as long as possible so they don't have to support two operating systems.

Behannon says Sitel is currently testing Win98 just as it would test any new product, and the company hasn't decided whether to wait for WinNT 5.0 or upgrade the company to Win98.

Dr. Mark Misic, director of information systems and communication services for the College of Business at Northern Illinois University, says that he's not actively discouraging individual users from upgrading to Win98, but to date, no one has. For the most part, Win95 continues to meet the needs of the faculty and staff. He says the College of Business has no plans to upgrade its network until the release of Windows NT 5.0.

No operating system will be perfect for every user every day, but Microsoft has made significant improvements over previous operating systems with Win98. In spite of the potential problems and price tag, Win98's advantages make it an upgrade worth the hassle for most users. ■

by Katie Dolan

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PC makers such as Dell post whether their PCs are ready

appropriate boxes. T users to go to the W and open the Windo The link stores your

and lets the online update inform you about the latest upgrades available, whether you system will support the changes, and what components, if any, you'll need for the upgrades.

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Life Beyond Windows

Lesser-Known Operating Systems Provide Alternatives To Microsoft

Lori Gavin

LET'S DO A LITTLE of what psychologists call "Gestalting." What word comes to mind when someone says "operating system?" If you're like most people, it's "Windows." Ever since the early 1980s when Bill Gates and Paul Allen inked a deal to supply IBM with DOS for its first attempt at PCs, Microsoft has been the champion of making and selling the software that helps us interact with our machines. But Microsoft hasn't completely mastered the operating system world. Several options exist for users looking for a better—or at least different—way.

Windows

The operating system story starts with DOS, which proved successful, but unfriendly for novices. If you didn't know the commands, you were helpless. In 1984, Apple changed the computing world forever by introducing the Macintosh. The Mac used an operating system that let users enter commands through the use of a mouse and pictures called **icons**, which represented the functions of the computer. The Mac's operating system was the first graphical user interface (GUI) and made personal computing more user-friendly and, therefore, more popular.

Microsoft was quick to grasp the importance of easy-to-use operating systems, and in 1985 introduced Windows 1.0. While it used a mouse and icons, this first attempt to steal Macintosh's thunder failed to evoke the public response Microsoft executives wanted. They persisted, however, with more versions of Windows. The most notable were Windows 3.1 in 1992 and Windows 95 (Win95) in 1995. Now, Windows is available in several forms including the new Windows 98 for personal and small-business use, Windows NT for use with networked groups of computers, and Windows CE for palmtop computers. The estimated number of people who use Windows around the world is a staggering 250 million.

Microsoft Corp.
(800) 426-9400, (425) 882-8080
http://www.microsoft.com

MacOS

The most obvious Windows alternative is not for PC-compatible computers, even though Macintosh's operating system (MacOS) began as the standard by which all versions of Windows were measured.

Apple, which seemed ready for last rites not so long ago, has enjoyed something of a rebirth of late. Under the watchful eye of Apple co-founder Steve Jobs (who left Apple in 1985 and returned recently as interim CEO), the company has sharpened its focus and responded to what it feels the consumer wants.

Sales figures for Apple's latest computer, the iMac, suggest that Jobs knows what he and his company are doing. Apple is said to have received 150,000 iMac pre-orders in one week starting Aug. 3, and the frenzy has continued since its launch on Aug. 15. Analysts project first-year sales of nearly 800,000 units. Of course, Mac loyalists aren't surprised. Fans of the Macintosh line have long maintained that MacOS, currently on version 8.1, is far superior to Windows in simplicity of use and performance.

But even if you believe the MacOS is superior to Win98, certain facts must be considered. One is that Mac computers make up only about 4% of the personal computer market. Software and accessory developers produce products compatible with the best-selling format nearly without exception, making Mac software and peripherals sometimes difficult to find. This doesn't discourage true Mac fans, but for many new computer buyers, owning a Mac is not worth the headache, and the quality of MacOS vs. Windows becomes moot.

Apple Computer Inc.
(800) 776-2333, (408) 996-1010
http://www.apple.com

OS/2

If you're looking for a Windows alternative but want a PC-compatible operating system, one option is IBM's OS/2. IBM, which made its mark selling powerful business and government computers, was initially unsure about the PC concept. To avoid diverting too much capital or personnel on a potentially passing fad, IBM decided to contract outside the company for operating system development. Enter Gates, Allen, PC-DOS, and Microsoft.

IBM PC sales were good, and companies soon clamored to enter the personal computing ring. IBM licensed many of them to produce compatible machines and, Microsoft, which had retained the rights to DOS, found itself in an enviable position. Although IBM and Microsoft collaborated on operating system development up until about 1993, a golden opportunity had been missed by Big Blue.

If you've never heard of nor seen IBM's OS/2 you're not alone. Originally a joint venture of IBM and Microsoft, early versions of OS/2 were amalgamations of text-based operating systems such as DOS and GUIs such as Windows. The current version, OS/2 Warp 4, runs OS/2, DOS, and Windows applications. It runs on PCs with only four megabytes of random-access memory (RAM), which is half that required to run Win95, and supports a full range of tasks, including Internet access.

Despite its efficiency and functionality, OS/2 poses little threat to Microsoft, with only 14 million copies of OS/2 Warp 4 shipped worldwide.

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Linux

Another PC-compatible operating system option is Linux, a version of the popular workstation and server operating system, Unix. Unix is a powerful system developed at AT&T in 1969 and based on the computer language C. Unix uses a command-line interface (similar in principle to DOS) with more than 600 commands, making for a fairly steep learning curve. Unix can run personal computers, but it costs several times as much as a full copy of Win98. Despite these drawbacks expert users like Unix for its immense power, stability, and versatility.

Linus Torvald developed Linux in 1990 while a computer science student at Helsinki University. He developed it as freeware, offering Unix's power without the hefty price. Free Linux versions can be downloaded from hundreds of 'Net sites or purchased on CD-ROM. Retail versions such as Red Hat Linux (published by Red Hat Software Inc.) cost about $50 and often come with the complete **source code** (the programming nuts and bolts) and a selection of Linux-compatible utilities and programming tools.

While Linux has ample power to run many Windows-based applications, few developers currently design their software to be implemented specifically with Linux. Major software players have recently come out in support of Linux, however. Corel has released a Linux version of *WordPerfect* 7 and plans to release version 8 soon, along with a complete package of office applications. Netscape offers a Linux-compatible version of its World Wide Web browser *Navigator 4.04* and plans to continue to support Linux.

The fierce competition between Microsoft and both of these companies may explain why they would seize any opportunity to take a dig at Microsoft. It doesn't, however, mean they would commit large amounts of resources to develop versions of their marquee products for an operating system they consider inferior. These companies like Linux's flexibility and stability, as do the approximately 7 million Linux users.

Linux is ideal for users needing the performance and stability of Unix to maintain a Web or network server from a PC at low cost. It also fits adventurous users who want the freedom to use their strong technical skills to develop their own applications.

Red Hat Software Inc.
(800) 454-5502, (919) 547-0012
http://www.redhat.com

BeOS

Be Inc. offers another alternative called BeOS. Its newest incarnation, version 3, is a GUI developed with the market-leading Intel processors in mind. While BeOS is easily distinguishable from Win95 or Win98 at a

The OS Gallery

MS-DOS—The Disk Operating System created in the early '80s by Microsoft co-founders Bill Gates and Paul Allen was developed specifically for use with personal computers. It uses a command-line interface, in which the operating system waits for text commands from users. Effective DOS use requires an extensive knowledge of its commands, and DOS is used today by experienced programmers or users who began computing before graphical user interfaces (GUI) became popular. DOS fell from popularity with the introduction of GUIs such as Apple's MacOS and Microsoft Windows.

MacOS—This GUI created for Apple's Macintosh computers heralded in the age of point-and-click navigation of computer functions, which in turn fueled the popularity of personal computing. The current MacOS, version 8.1, is used primarily by die-hard Mac users, graphics artists, and a fairly large segment of educators.

Windows—The reigning champ of operating systems, Windows powers the vast majority of the world's computers, boasting about 250 million users. Its current version, Windows 98 is selling well despite mixed reviews. This GUI supports the point-and-click approach. As new technologies emerge, Microsoft grafts them onto the original Windows frame. The hallmark of the

glance, it does not appear totally foreign to Windows users. BeOS utilizes a Trackbar in the top-left of the screen to keep users appraised of applications which are currently active, to navigate the computer's directories, and to run searches. (Sound vaguely like a Win95 Taskbar?)

BeOS also uses **soft links**, which are icons that can be placed on the screen for quick access to commonly used programs or files. (Sound a little like shortcuts?) In fact, BeOS even uses windows to display current applications on the screen and isn't shy about calling them windows.

The windows-based look of BeOS shows that Be wants to change how operating systems are built, not how we use them.

The idea behind all this is not to revolutionize how an operating system looks, but to change how it works, making it more stable, Internet-ready, and most importantly, more media-oriented. Be set out to create an all-new operating system built from the ground up based on today's hardware and application needs, especially where multimedia applications are concerned.

Windows' detractors are quick to point out its inability to let go of its history. Each new version of Windows is really a revision of previous incarnations, not a new program altogether, which is somewhat akin to repainting a car or reshaping its fenders rather than developing a new chassis or engine. Microsoft doesn't deny this philosophy, maintaining that good software development relies on "Evolution, not revolution." But basing a new operating system on the architecture of an old one creates severe limits where new technology is concerned, according to the Be team. BeOS, therefore, is all-new and made with the latest technology in mind.

BeOS is available for $49.95, and you can download a free trial version at Be's Web site. You can run the trial version over Windows to see whether you like it without having to format your drive and reinstall all your software. BeOS is great for users who need cutting-edge functionality to create and use video and audio media applications.

Be Inc.
(650) 462-4129
http://www.be.com

Looking at the major players in the operating system arena shows there's obviously no serious threat to Windows' dominance. But it's also interesting to note that while Windows runs nearly 90% of the world's computers, there are still companies and programmers out there with the intestinal fortitude to step up to the plate and take a shot at the software giant wherever there's a chink in the armor. ■

by Chris Trumble

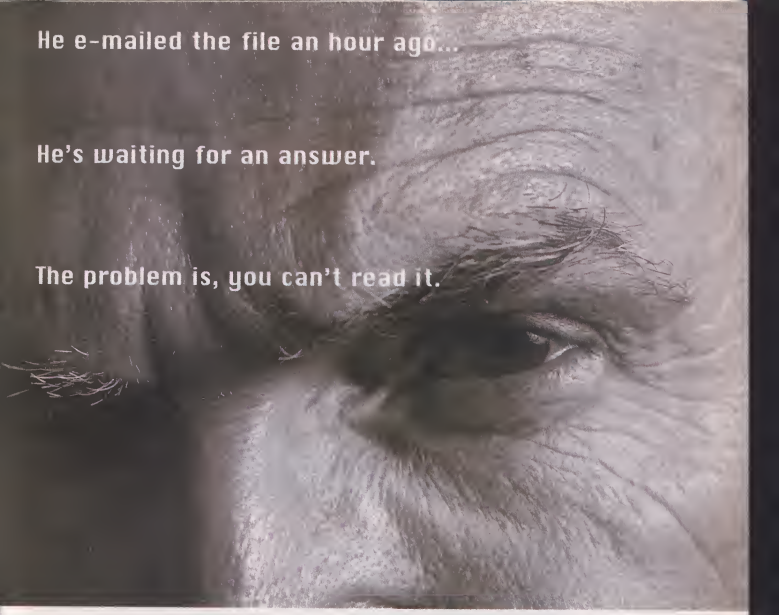
Windows series is continuity, ensuring that Windows 95 users, for example, should have little trouble adjusting to Windows 98.

OS/2—Originally developed as a joint venture between Microsoft and IBM, OS/2 development became an IBM solo act when Microsoft spurned the partnership to release Windows NT. The current OS/2 Warp 4 has about 14 million users worldwide, but this GUI has failed to make much headway against Windows in terms of market share or technological superiority.

Unix—This operating system developed at AT&T in 1969 by Ken Thompson is used today for running workstations and servers. Companies often entrust their mission-critical applications to Unix, due to its extreme stability. Unix is closely related to the programming language C and is somewhat complex, having more than 600 commands. Programmers and network administrators love Unix because its complex interface provides access to vast computing power.

Linux—This version of Unix is close to Unix in function and power, but with one major difference. While Unix is fairly costly to implement, Linux can be downloaded for free from hundreds of sites around the Internet. Linux's source code is also available to the public, so developers can create their own Linux applications. Linux is popular among Web and network server administrators, and some software developers are now releasing versions of their feature applications in Linux-compatible formats.

BeOS—BeOS version 3 is a cutting-edge, multimedia-enabling operating system from Be Inc. BeOS is designed to function similarly to Windows on the surface, but is modeled around new technologies and reflects modern computing in its design. BeOS is targeted at users with a need for top-shelf media creation abilities. ■



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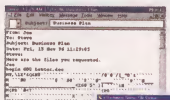

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Healthy Hard Drives

Investments In Disk Maintenance Utilities Buy Better Drive Performance

Brad Gaskill

WE TEND TO THINK of our hard drives as roomy closets. It might be better to think of them as bodies. Just as your body needs periodic maintenance to work at its best, so does your hard drive. Your PC's operating system already includes some basic hard drive maintenance tools, but they can be a bit underpowered. Sophisticated hard drive maintenance usually comes with the purchase of a dedicated drive utility package.

Though the operating system tries to avoid problems when storing data, they do arise, with the three most common being **cross-linked files**, **lost clusters**, and **disk fragmentation**. Cross-linked files occur when the operating system thinks two files are on the same storage unit called a cluster. Lost clusters occur when a cluster contains data but the operating system thinks it's not owned by a file. Disk fragmentation occurs when the clusters that make up a file are scattered. This forces the operating system to access multiple hard drive locations to load the fragmented file. This slows loading and makes it harder to recover the file after a disaster. Drive optimization, also known as **defragmentation**, rearranges the hard drive so all the clusters of each file are together and in order. Once a drive is optimized, all the free space is together so new files tend to be created automatically in an unfragmented form. This, however, will deteriorate over time, making regular defragmentation a necessity.

Operating System Solutions

DOS and Windows 3.1 users can correct these problems by running the ScanDisk utility. This tool finds and corrects cross-linked files and lost clusters, plus it can scan the entire hard drive to make sure it is problem-free.

DOS comes with a disk optimization program called DEFRAG. The Windows 95 and 98 (Win95 and 98) version is called Disk Defragmenter.

While ScanDisk and DEFRAG (or Disk Defragmenter) can address the most frequent hard drive problems, for the most powerful maintenance software, you must look beyond the operating system to specialized utility programs. These programs give you more features, easier operation, the ability to address more problems, and more flexibility than built-in utilities. (For details on built-in drive utilities, see "Basic Training" in this issue.)

Utility Packages

Large-scale utility packages, such as *Nuts & Bolts 98* or *Norton Utilities 3.0*, provide a complete suite of tools. These packages include a utility to prevent or solve most typical hardware and operating system problems. The advantages of using one troubleshooting suite are that you must learn only one interface and you can shop once for a tool that handles all your maintenance.

The major features common to both Nuts & Bolts 98 and the Norton Utilities 3.0 are:

- hard drive testing and repair
- hard drive defragmentation
- Windows crash protection
- storing copies of the partition table, file allocation table (FAT), and boot record for easy recovery
- creating a bootable rescue diskette
- optimizing the Win95 Registry, which holds system configuration information.

Nuts & Bolts 98 also offers unique tools for file encryption, secure file erasing, and antivirus protection. Norton Utilities 3.0 adds file unerasing, an Iomega Zip disk rescue disk with a bootable copy of Windows, space wizard to erase or archive unneeded files, and hard drive unformatting.

Both Norton Utilities 3.0 and Nuts & Bolts 98 include drive optimization programs that significantly outperform Disk Defragmenter. Both programs use the Win98 file usage information to place commonly used files at the outer edge of the drive. This "reordering" speeds up access to these common files, which are typically programs, while placing lesser-used files near the center of the drive, near the free space. Since these are typically data files, reordering also reduces future fragmentation.

In addition to reordering, Nuts & Bolts 98 lets the user specify a custom arrangement. For example, a user could elect to place a large, permanent **swap file** at the outside edge of the hard drive. (Operating systems use swap files to hold parts of programs too large to fit in main memory.) Norton Utilities optimizes the Windows Registry, in addition to the hard drive, and runs the fastest of any of the optimization programs.

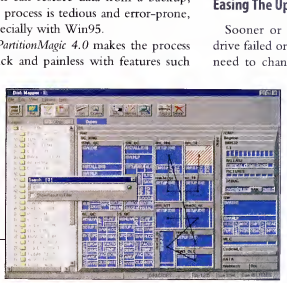
Nuts & Bolts 98's Disk Minder program scans your hard drive and locates and corrects problems. It's faster and more comprehensive than ScanDisk. Norton Utilities 3.0 includes Norton Disk Doctor (NDD) for the same purpose. It, too, can find and correct more problems than ScanDisk. Both third-party utilities can be scheduled to run when the computer is otherwise unused.

With each new release, utility packages gain new features and become more useful. Major packages still fall short, however, in some areas such as disk mapping, hard drive partitioning, and hard drive installation. For these areas, you'll still need a program specializing in hard drive maintenance.

Mapping Your Hard Drive

When it's time to free up drive space, it can be difficult to see which folders and subdirectories are taking up too much space. DOS' DIR command and the Windows File Manager or Windows Explorer show you only one subdirectory or folder at a time.

DiskMapper 2 shows how much space files and folders take up in a map of your entire drive. Using this map, you can view the entire hard drive or zoom in and out of subdirectories for a more comprehensive inspection. There's no better way to spot those overstuffed subdirectories. You also can use DiskMapper 2 to delete or compress the unnecessary or rarely used items you find without switching to another program.



***DiskMapper* reports on your storage situation in a glance with its graphical representation of your files.**

Divide & Conquer

Partitioning is the process of treating one physical hard drive as though it were multiple hard drives. Some operating systems require partitioning of large hard drives, but even when that's not the case, there are major advantages to partitioning:

- The same file often takes up less storage space on a smaller partition than on a larger partition.
- Multiple partitions let you segregate your programs on one partition, your data files on a second partition, and your swap file on a third.
- You can boot from multiple operating systems.

(The theory and process of partitioning were explained in detail in "Reclaim Storage With Partitions" in our August 1997 issue.)

DOS and Win95 include tools for changing your drive's partitioning. You first run FDISK to change the partitioning and then FORMAT to reformat the drives. The disadvantage of using these tools is that all your programs and data files are erased, leaving you with blank partitions. While you then can restore data from a backup, the process is tedious and error-prone, especially with Win95.

PartitionMagic 4.0 makes the process quick and painless with features such as the ability to repartition without erasing the hard drive. The program is a DOS utility, so if you are using Win95 or 98, you must first exit to DOS. PartitionMagic simulates a Windows interface so you'll feel comfortable running the program.

You tell PartitionMagic how large to make the partitions, either graphically or by typing values. It then moves the free space around and creates the partitions automatically. It will not, however, move files for you. If you want, for example, to create a D: drive for all your data, you must manually move the files after creating the partition. PartitionMagic checks the hard drive for problems and aborts if it finds any, so you should first run a scanning program discussed above.

PartitionMagic is simple enough to use that you may find yourself running it occasionally to adjust the sizes of partitions on your system. The program also can convert to and from FAT16 and FAT32, which requires Win95 Original Equipment Manufacturer Service Release 2 if you don't have Win98. (See "Using FAT32" in our October 1998 issue.) PartitionMagic includes BootMagic for managing multiple operating systems installed on multiple partitions. This lets you easily run Windows 3.1 and Win95 or Win95 and Win98 on one PC.

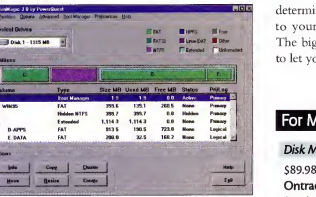
Easing The Upgrade

Sooner or later, whether your old drive failed or grew too small, you will need to change or add a hard drive. Your choices are to go in and swap out drives or add a second drive. In either case, you can make the job easier with software utilities.

Many systems, particularly older systems, limit the size of your hard drive to 504 megabytes (MB). If you want to install a drive larger than this, you have two options: either partition the drive or use a program such as *Disk Manager* or *EZ-Drive* to get around this limitation. These utilities are so useful that most hard drive vendors now include one of them with their drives.

To use these programs, you set the **jumpers** (small switches) on the new drive as specified by the manufacturer and install it. If your PC's Basic Input/Output System (BIOS) supports auto drive type selection, you use that setting. Otherwise, both programs have

Partitioning hard drives for better performance becomes a simple task for anyone using *PartitionMagic*.



options to help you find the correct jumper settings. Now you start the PC from a diskette (instead of the hard drive's startup files) and run the program. Both offer quick installation settings that will create a single partition, format the drive, install special software (if needed), put the DOS boot files on the drive, then prompt you to reboot the PC. After this, you're ready to install your operating system.

Once you install a replacement or second hard drive, you need to load it with software. If you're looking to move files among drives, make it easier with the right software utility.

DriveCopy 2.0 copies the information from one hard drive to another drive on the same system. If you're upgrading to a larger hard drive, you can install the new drive without removing the existing drive. With both installed, you can use DriveCopy to make the copy. You're then free to remove or reformat the original drive.

The opening screen offers the options of copying one entire drive to another drive, copying one partition to another partition, or displaying information on the drive. DriveCopy 2.0 can handle drives and partitions of different sizes, as long as the target has adequate space for all the files. It even can create partitions on the target drive automatically.

DriveCopy 2.0 only copies between drives or partitions on the same system. If you want to create a backup image of your hard drive, try *Drive Image 2.0*. This program creates a compressed image of a partition, such as your C: drive. If disaster strikes, you simply restore the image, which includes all the system's hidden files.

In many ways, Drive Image 2.0 is superior to a tape backup. With the latter, you must restore Windows and the backup software before you can use the backup tape. Drive Image 2.0 is a DOS program that runs from a bootable diskette you create, which means you can immediately use it to recover your system. Drive Image 2.0 automatically recognizes and uses Zip, Jaz, and SyQuest drives, and the images it creates are compressed and can span multiple disks.

The Ultimate Recovery Disk

You should have a bootable diskette to use if problems develop that prevent you from booting from your hard drive. Its small capacity, however, limits what recovery tools you can put on that diskette. *Z-pA* overcomes that problem.

This small $15 utility program lets you optionally boot from a Zip disk. It only works with the older IDE/ATA Zip drives. A separate version of the program (*ZppA*) works with parallel port Zip drives. DOS, Windows 3.1, and earlier versions of Win95 only support diskette drives up to 32MB. If you have one of these operating systems, Z-pA includes a program that formats a Zip disk as a 32MB disk so the operating system can recognize it. With either 32MB or 100MB of space, there's room for all the disaster recovery tools you might need. Z-pA and ZppA are shareware, and a trial version is available at the author's World Wide Web site at http://www.blueskyinnovations.com.

No one user may need all the tools described here. But check them out to determine which utilities are best-suited to your hard drive medicine cabinet. The biggest mistake you could make is to let your drive go untreated. ▮

by Ronny Richardson

For More Information:

Disk Manager

$89.98
Ontrack
(800) 872-2599, (612) 937-5161
http://www.ontrack.com

DiskMapper 2

$49.95
Micro Logic
(201) 342-6518
http://www.miclog.com

DriveCopy 2.0

$29.95

Drive Image 2.0

$69.96
PowerQuest Corp.
(800) 379-2566, (801) 437-8900
http://www.powerquest.com

EZ-Drive

$19.95
Micro House Solutions
(800) 926-8299, (303) 443-3388
http://www.solutions.microhouse.com

Norton Utilities 3.0

$79
Symantec Corp.
(800) 441-7234
(541) 334-6054
http://www.symantec.com

Nuts & Bolts 98

$49.95
Network Associates
(800) 338-8754, ext. 2225
(408) 988-3832
http://www.nai.com

PartitionMagic 4.0

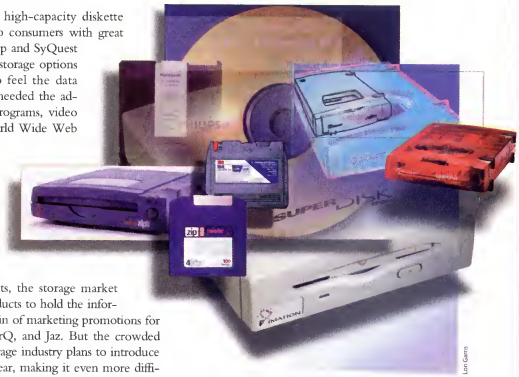
$69.95
PowerQuest Corp.
(800) 379-2566, (801) 437-8900
http://www.powerquest.com

The Storage Market Intelligence Report

JUST A FEW YEARS AGO, high-capacity diskette drives were introduced to consumers with great hoopla. Names such as Zip and SyQuest offered reasonably priced storage options to consumers starting to feel the data crunch. Computer users needed the additional space for huge programs, video files, sound clips, and World Wide Web pages. While a 100 megabyte hard drive was roomy about five or six years ago, some of today's programs consume that much space single-handedly.

Every time new data or programs arrive with larger storage requirements, the storage market expands with enough products to hold the information. There's a steady din of marketing promotions for names such as Shark, SparQ, and Jaz. But the crowded field isn't full yet. The storage industry plans to introduce several new options this year, making it even more difficult for consumers to choose a storage medium. Tough questions surround finding what is right for your needs and making sure you get the most megabyte for your money. Savvy market-watchers must wonder whether their choice will survive in this competitive arena.

Guide your buying with the following report on the foremost storage options, reasonably priced for consumers and small businesses. We provide you with information on what is available and at what price, as well as the industry experts' predictions for the years to come.



Lori Gerns

The Big Floppy

In 1995, Iomega hit the consumer storage scene with its Zip drives. The purple drives could store up to 100 megabytes (MB) on a disk not much bigger than a regular 1.44MB diskette could. Its arrival marked the first time many consumers considered an alternative storage medium to their hard drive or possibly a tape drive.

Zip drives remain the big sellers in the "high-capacity" flexible disk drive market. Iomega (800/697-8833, 801/778-1000, http://www.iomega.com) announced this summer that it hit the 15 million mark for shipped drives. With so many Zip drives out there, the company hopes one day the Zip drive will become as commonplace as the regular 1.44MB diskette drive. Zip does have an edge: With all the Zip drives available, you have a greater chance of exchanging data via Zip disks with other users. And at $99 for the drive and $10 for a disk (when bought in a 10 pack), the price is about right.

Zip continues to out-sell the closest competition about five to one, says James Porter, president of the Disk/Trend market research organization. But the closest competition, Imation's SuperDisk, or LS-120, has significant strengths that make it a key player. **Laser-servo technology**, which is synonymous with the SuperDisk name, uses a combination of magnetic

and optical components. An optical sensor positions the read/write head in the drive precisely over the data tracks, and the data is stored magnetically, just as in an ordinary diskette.

Several companies including Imation, O.R. Technologies, Compaq, and Digital Research Technologies sell SuperDisk drives. Also, LS-120 drives are backward-compatible with ordinary 1.44MB drives. That means you can read information off your 1.44MB diskettes with a SuperDisk drive and save to those old diskettes. Zip drives use only Zip disks.

The LS-120 community was the first on the market last year with drives that could be used in notebook computers, says Fara Yale, director and principle analyst for storage at Dataquest, a market research company. SuperDisk companies have a number of agreements with notebook makers to include LS-120 drives in their portable systems, as well as in regular personal computers. Iomega, however, has just started shipping the notebook Zip drives and hasn't yet grabbed part of that portable market.

Additional notable competitors include the 250MB Avatar Shark which has an **access speed** (how long it takes the read/write head to move to locate data on a particular spot on the disk) of 12 milliseconds (ms) and the 230MB EZFlyer by SyQues, which has an access speed of 12ms (800/245-2278, 510/226-4000, http://www.syquest.com). The EZFlyer drives sell for about $149, and cartridges are available for about $25 a piece. The EZFlyer operates differently from other removable disk drives, placing all the same heads, motors, media, and electronics used in regular hard drives in the SyQuest cartridges. The Shark (888/462-8282, 408/321-0110, http://www.goavatar.com) sells for about $199, and the 250MB HARDiskette media sells for about $39.

A few additional contenders have plans in the works. Sony is hoping to make a late, but strong, entry into this removable storage category. It will have quite a battle, Yale says, considering it will have to displace products that have been on the market for more than two years. Sony's **High Capacity Floppy Disk Drive System (HiFD)** should store 200MB of information on removable diskettes. HiFD will be a fast drive with a sustained read transfer rate of 3.6 megabytes per second (MBps) and a write transfer rate of 1.2MBps. But Sony (800/352-7669, http://www.ita.sel.sony.com) isn't saying much more about HiFD, probably because the company promised to have the drives out by the second quarter of 1998. (The drives hopefully should be available by the time you read this.) Assuming Sony will release the drives by the end of the year, Porter says all the other characteristics of the drives won't make as much difference as the price.

"The most important technical specification is the price," says Porter, no matter what kind of removable drive you are looking at in this category. It will determine whether consumers will buy the drives and whether the drives will stand the test of time.

Currently, Zip drives run about $99 to $180, depending on whether they are an internal, external, or a Universal Serial Bus (USB) model. So Sony will have to price HiFD competitively. LS-120 is priced similarly. Imation (888/466-3456, http://www.imation.com) sells its SuperDisk for about $150 and offers $50 rebates indefinitely. Porter says Zip drives are ultimately cheaper to make because the embedded servo technology they use is less complicated than the laser-servo technology of the SuperDisk.

The one gigabyte SparQ by SyQuest may be one of the few higher-capacity cartridge drives that could challenge Zip's hold on the consumer storage market.

The Removable Gigabyte

The next step is the "removable gigabyte," or rigid cartridge category. In most cases, these drives are targeted at business and professional users because of their larger storage capacity and slightly higher price. The idea is that one gigabyte (GB) and higher-capacity cartridges are better used for large graphics files and databases created by professionals. According to Disk/Trend, the rigid disk cartridge drive market will grow slowly. In 1997, shipments were 1.4 million. In 2001, the number of shipments is predicted to reach only about 6.2 million.

For instance, Iomega's Jaz offers consumers 2GB of storage per disk with an access speed of 10ms (read). The drives sell for $499, and each 2GB disk sells for about $99 when you buy them in a three-pack. (The 1GB Jaz drive model available earlier this year will probably be discontinued in late 1998.) SyQuest's SyJet uses 1.5GB cartridges and has an access speed of 12ms. The drives sell for $299, and each cartridge costs about $79. As you can see, in this category you pay a few hundred more for the drive and pay significantly more for each cartridge, although you get more storage.

SyQuest challenged that business/professional nature of this market when it introduced the SparQ this year. The drive, which can store 1GB per cartridge and has an access speed of 12ms, was priced at $199. This is the same introduction price of the Zip drive a few years ago, Porter says. The 1GB SparQ cartridges sell for about $33 when purchased in a three-pack. That's nearly the cheapest cost per megabyte when compared to other drives in this category, although the SparQ's data transfer rates may be slower than the competition's.

The Orb by Castlewood Systems (510/224-9900, 925/461-5500, http://www.castlewoodsystems.com) is another upcoming product that should attract consumers. The company considers the drives "video-ready," meaning you can play video from the drives because of its fast data-transfer rate. The Orb stores up to 2.16GB per disk, using a **magnetoresistive (MR)** technology that allows for a larger concentration of data on the storage medium. The drive sells for about $200, and disks should cost about $30. Originally the drive was expected to ship to retailers the first quarter of 1998. The company has offered no additional information about when the drive may be available for consumers.

The big name in this category is the Quest by SyQuest, which began shipping to stores this fall. It stores up to 4.7GB per cartridge and has an access speed on 12ms. The maximum sustained data transfer rate for the internal drive is 10.6MBps, which make it store data rather quickly. The drives are priced a little more than the competition at $599, and each 4.7GB cartridge costs about $199. That's comparable to how much you might pay for a 4.7GB hard drive. Businesses are likely to be the first to pay that amount and desire that much storage per disk for large databases, presentations, or video files.

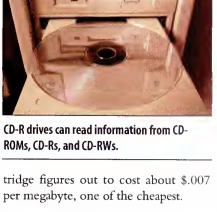
The Tape Drive

Businesses will also have a use for tape drives, which can back up large amounts of data in a single shot, keeping all those important client records and sales in case of disaster. But what about average consumers? How can the tape compete with all these great removable alternatives?

Tape drives have the disadvantage of retrieving data more slowly than the other options. For instance, the Zip drive (which is no speed demon compared to a hard drive or one of the larger alternatives) has a sustained data transfer rate of about 1.4MBps, or 11.2 megabits per second (Mbps), and an access speed of 29ms. Iomega's tape drive, the Ditto, has a data transfer rate of 2Mbps, which is remarkably slower, and an access speed of 85 inches per second (ips). And not only does a tape drive transfer data more slowly, it also takes more time to locate that data.

Tape drives, however, costs about the same as many of the other storage alternatives. For example, the Iomega Ditto sells for about $199. One point in the tape drive's favor: A tape drive can make incremental backups, only backing up new information, so it doesn't have to waste space backing up the entire drive. Also, most hard drives for the serious user are about 6GB to 8GB. It can be very tedious to back up so large a drive to a 100MB diskette or even a 1GB cartridge.

If you're worried only about creating a second copy of your hard drive in case of disaster, Porter says a tape drive may be your most cost-effective means for backup. For $20 a 3GB minicar-



CD-R drives can read information from CD-ROMs, CD-Rs, and CD-RWs.

tridge figures out to cost about $.007 per megabyte, one of the cheapest.

The Compact Disc

Your next storage option doesn't use magnetic means to store data. Compact discs (CDs) use optical technology to "burn" data onto shiny, round discs. That means lasers write those digital ons and offs, 1s and 0s, onto the discs. Compact disc technology can store about 650MB per disc.

Most computer programs come on CD read-only memory (ROM), and most computers now include a CD-ROM drive. But you can't store information with a CD-ROM drive; it's read-only memory. You need either a **CD-Recordable (CD-R)** or a **CD-Rewritable (CD-RW)** drive.

CD-R drives, introduced in 1995, use gold CD-Rs with a blue/green polymer. A laser burns unreflected and reflected areas to make digital data. You can save data only once, however, to the surface of the CD-Rs. Once you fill up the disc, it's done. You can't write over the data. That's where CD-RW comes in. This **phase change technology** alters the material on the disc from a reflective state to an opaque state creating the ons and offs of digital data. The new technology also can be rewritten, so you can re-record information over the top of old information.

CD-R drives can read information from CD-ROMs, CD-Rs, and CD-RWs. But they can only record to CD-Rs. CD-RW drives can read information from all three discs, plus it can record to CD-Rs and CD-RWs.

The benefit of CD-R and CD-RW drives is that they are ideal for creating your own software, presentations, or multimedia brochures. Because both types can be read in CD-ROM drives, they are easily exchanged and distributed to other computer users.

The cost of CD-R and CD-RW drives depend on the speed of the drive you want. Although many CD-ROM drives can read data at 20-speed (20X) or 24X, a really fast CD-R drive may read at 20X, but only write at 4X. For example, a Smart and Friendly (800/542-8838, 818/772-8001, http://www.smartandfriendly.com) CD-R internal Speedwriter can write at 4X and read at 12X, costing as little as $400. Smart and Friendly's 2006 can write at 2X and read at 6X for less than $350 for an internal unit. A faster unit from Smart and Friendly, the CD-R Rocket, can write at 8X and read at 20X and costs about $999. CD-Rs are extremely cheap, coming in five-packs for about $5.

On the CD-RW side, Smart and Friendly's CD-RW 426 Deluxe, which can write to CD-RWs at 2X, CD-Rs at 4X, and read at 6X, costs about $600 for an internal unit. The CD-RW media costs about $18 to $22 per disc.

Mary Bourdon, principle analyst at Dataquest, says most users will find CD-R drives good enough for their needs. CD-RW drives may seem to have it all, but these drives are still struggling to find the "killer app," she says. Most consumers and small business users don't need a drive that can rewrite data to a disc. They're using CD-R drives to store training information or marketing materials to be distributed. And price is still a major point here, with CD-RW costing more than $100 more than CD-R drives.

Once CD-RW drives hit the $299 mark, they may overtake CD-R drives. Smart and Friendly planned to unleash a super-fast CD-RW drive, the CD-Racer, this fall that could operate at 24X for playback and 2X for writing. The price was expected to start at about $299.

The Allusive DVD

The next step up from CDs are **Digital Video Discs** (**DVDs**). They came on strong last year, but that was the read-only memory version of this technology. A rewritable version of DVD has long been out of our reach. One reason may be the standards competition between the key players.

In the beginning, there was **DVD-RAM**. Originally, this format was endorsed and agreed upon by big names such as Panasonic, Toshiba, Sony, and Philips. DVD-RAM was approved by the DVD Format Forum, storing about 2.6GB per side. But at the end of 1997, Sony and Philips pulled out and decided to go a new direction. They developed a new format, **DVD+RW**. This standard offered 3.0GB per side. All the while, Pioneer developed its own standard, **DVD-R/W**, which can record up to 3.95GB a side, Bourdon says.

DVD-RAM is the only standard on the market. Panasonic, Toshiba, and Hitachi all have DVD-RAM drives. For instance, Panasonic's LF-D101 internal drive uses the DVD-RAM format to store up to 2.6GB per side of a DVD (800/742-8086, 201/348-7000, http://www.panasonic.com). The drive costs about $700 and discs about $25 each. Sony and Philips probably won't deliver until early 1999. Bourdon says Pioneer's recordable drives are just a by-product of its pricey DVD-Recordable drives that sell for $17,000, and are used in enterprises for large jukebox-type storage. Pioneer is not rushing to deliver DVD-R/W drives to compete in this market.

Because there is no standard, this may be a storage category that consumers should avoid until a standard is set. Besides, with a price of $799, many consumers may find these drives a little out of their budget, although the 2.6GB discs have a very affordable price per megabyte of one cent.

Hard Drives

Of course, if all you want to do is run more programs on your computer, the obvious choice is another, bigger hard drive. The reason is that hard drives have fast data transfer rates so they can put information on your screen quickly.

Currently 10GB to 12GB seems to be the largest capacity priced for average consumers. Low-end 2GB and 4GB drives are priced from $100 to $200. Quantum (800/624-5545, 408/894-4000, http://www.quantum.com), for instance, sells its Fireball EX 3.2GB drive for only $139, and its Fireball EX 5.1GB is only $10 more, for $149. Another example of a low-priced consumer drive is Seagate's 4.3GB Medalist 4342, which costs about $155 and has a 11ms access speed (800/732-4283, 405/936-1210). Seagate's whopping 10GB drive, the Medalist 10240, costs $325, which puts its cost lower than the startup cost for many of the higher-capacity cartridge drives and CD-R drives. Quantum's big Fireball EX 12.7GB sells for about $319, and its Bigfoot TX 12GB sells for $299, making both excellent buys.

Looking Ahead

While the prospect of gigabytes of data on a single disc may amaze you, there's more where that came from.

When you run out of hard drive space, Zip disks are a great storage option.

For instance, Quinta, now a subsidiary of Seagate, has been working on a technology that promises to store five times as much data as a typical magnetic medium. Using a technology called **Optically Assisted Winchester technology** (**OAW**), the company plans to break the traditional barriers of hard drive storage. Traditionally, the "super-aramagnetic limit" is believed to be 20GB to 40GB an inch; beyond that, most hard drives can't hold data reliably. Quinta plans to use a combination of a new generation of media, a unique head design, and a laser-based light network using light pulses to exceed that limit. This fixed-disk drive may give the rest of the hard drive market a real scare.

While Quinta is upping the ante five-fold, Terastore is promising to outdo magnetic storage by tenfold. The company's initial removable disk product will be available with 10GB disks, perhaps by the end of the year, Porter says. Next year the company may introduce disks that can store 20GB per side. Eventually, Porter says, Terastore will offer 40GB on a two-sided disk.

With all the technologies we've discussed, Porter predicts we'll inevitably see a trickle-down. At first the Quinta and Terastore technologies may be used for immense storage jobs or used instead of high-end tape drives in business. But once the technologies become more widespread, they will become "normalized," he says. **II**

by Cindy Krushenisky

Zip Tips & Tricks

Matt Morrow

IF YOU OWN A ZIP DRIVE, you're in good company. According to Iomega, Zip's maker, more than 15 million people own these drives, which use disks that store 100 megabytes of data. Zips come in a variety of forms: internal or external and are connected via Small Computer System Interface (SCSI), parallel, or even Universal Serial Bus (USB) ports. No matter what the interface and form they take, all Zip drives operate in basically the same fashion.

For many, the Zip drive is an extension of the computer. Many users, however, don't take advantage of the easy-to-use utilities that come with their drives and many users don't know how to read- or write-protect their disks, change drive letter assignments, or perform other practical functions. We dug into the pool of knowledge surrounding the Zip device and found the following easy-to-follow overview of the Zip Tools disk that comes with your Zip drive, plus a handful of tricks and tips.

Zip Tools

The Zip Tools disk comes with five basic utilities in addition to *Guest*, which is the software that allows your Zip drive to connect with someone else's computer. They are *1-Step Backup*, *1-Step Restore*, *AppMover*, *Copy Machine*, and *Iomega Watch*. You also have help files, and a Zip Tips file, which is little more than a shameless attempt at getting you to buy more Zip disks.

1-Step Backup (and Restore). A Zip drive makes performing backups so easy that it's insane not to do it at least once a month. 1-Step Backup lets you customize your backup and give it a name, description, and password. You also can perform selective backups with ease. 1-Step Restore is the counterpart of 1-Step Backup; it returns the backed up files, folders, and programs to their original locations. (*NOTE: 1-Step Backup (and Restore) is unavailable for Windows 3.1x, DOS, and networks.*)

AppMover. AppMover lets you move an application from one drive or directory to another and will automatically change all linked files so you can run them from the new location. It is invaluable if you want to move applications from one drive to another without the having to reinstall them and possibly lose all your preferences. Just pick an application, pick a destination drive, and click Move!

Copy Machine. Copy machine lets you copy files from one drive to another, including from one Zip disk to another with only one drive. It offers several options, including copying only changed files, skipping files of the same name, and asking before overwriting any file. It's also helpful if you have problems with a drive or need to copy non-Windows files, since one copy option will take a snapshot of the drive and copy it, sector by sector rather than file by file, to the new destination drive.

Iomega Watch. Iomega Watch is simple; opening it brings up a dialog box that lets you instruct the system to search for read-protected drives (more about that later).

Tips & Tricks

Now that you're familiar with Zip's utilities, let's take a look at Windows support for Zip drives. Double-click the My Computer icon on the Desktop, then right-click your Zip drive icon. On the appearing pop-up menu, you'll see the Open, Explore, and Find commands. Below them, you'll see a host of other commands. Several of these commands are self-explanatory; the following are the ones that need a little explanation.

Copy Disk. Copy Disk automatically transfers the contents of your diskette drive to a Zip disk.

Protect. Zip disks can be write-protected only through software. By selecting this option, you can write protect or read-and-write protect a disk. You also have the option of providing a password. (*NOTE: If you read-and-write protect a disk and then forget the password, you cannot recover the information on the disk. It must be reformatted!*)

Make Non-Removable. This option makes your Zip disk appear to the system as a non-ejectable hard drive. This is useful when you want to prevent accidental ejection of your Zip disk.

Properties. The Properties dialog box lets you check the amount of free drive space, the maintenance schedule,

and the file sharing status of the Zip disk in the drive.

Drive Letter Assignment

Nearly all Zip drive problems occur as a result of drive letter assignment or lack thereof. In addition, there may be times when you want to change the drive letter assignment. For example, if your hard drive configuration changes (you add or delete one), Windows may alter the drive letter assignment on your Zip drive. If you have shortcuts associated with that particular drive letter, Windows won't be able to find them and you'll have to start from scratch. By changing the drive letter back, you can save your shortcut associations.

To check the drive assignment in Windows 3.x or DOS:

1. Make sure Iomega Guest is controlling your drive letter assignment and not an Advanced Small Computer System Interface Programming Interface (ASPI) manager. Use Notepad to check your Config.sys and Autoexec.bat files. Type **Rem** in front of each line that contains the word ASPI (this process is called **remarking out** the line).
2. Check your "lastdrive" statement in Config.sys. The lastdrive statement limits the number of drive letters the system can assign. Make sure the line "lastdrive=x" in your Config.sys file provides enough drive letters to handle all your drives. (If you have six drives, try "lastdrive=g".) Don't go for more drives than you need.
3. Assign a drive letter to your Zip drive by adding the line "guest drive letter=x" where "x" is the drive letter of your Zip drive.
4. Move the "lastdrive=" and "guest drive letter=" lines to load before the "win" line.

To check in Windows 95/98:

1. Right-click the My Computer icon and choose Properties and then the Device Manager tab.
2. Click the plus (+) sign next to disk drives. Double-click the Iomega Zip 100 icon
3. Click the Settings tab then look at the Current Drive Letter Assignment window. If it is empty, you will need to assign the drive a letter. If it already has a drive letter, you should try changing the letter if you are having problems.
4. Click the down arrow in the Start Drive Letter window. A pull-down menu should appear with a list of drive letters. Select a drive letter for the Zip drive; that letter should also appear as the End Drive Letter (make sure these letters match).

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Iomega has responded to criticism of poor support by filling its World Wide Web site (http://www.iomega.com) with helpful technical information.

(NOTE: In most cases, Windows 95 doesn't require the use of a "lastdrive" statement in the Config.sys file. If in step three the only drive letter available is a drive letter already in use, add the line "lastdrive=n" to your Config.sys file to resolve this problem.)

Driver Conflicts

A final problem for Zip users can be device driver conflicts. To find driver conflicts in Windows, restart your Windows 95/98 computer in MS-DOS Mode or restart and move to a DOS prompt on Windows 3.1 machines. Insert the Zip installation diskette into the A: drive, type **a:\guest**, and press ENTER. If the Zip drive works and you cannot reproduce the problem, then there is a problem with a driver loading in Windows. You can find these drivers in the Win.ini or System.ini files. Follow the next few steps to use Sysedit to locate the source of the problem.

1. In Windows 95/98, select Start, Run.
2. In the Open box type **sysedit**, then click OK. (In Windows 3.1, open Program Manager's File menu and choose Run. Type **sysedit**.)
3. Locate the Win.ini file and remark out the "Run=," "Load=," and "Device=" lines by placing two semicolons (;;) in front of these lines. (Back up all system files before making changes.)
4. Select File, Exit, save the changes when prompted, and then restart Windows.
5. If the problem still appears, the cause is not in the Win.ini file. Remove the semicolons, save the file, and move on to the next step. If the problem is resolved when you restart Windows, there is a conflicting driver in the Win.ini file. Remove the semicolons from either the "Load=," "Run=," or "Device=" line, restart Windows and test your Zip drive again. If the problem still doesn't appear, remove the semicolons from another line. Once you the problem reappears, the process of elimination has shown that the last set of semicolons removed indicates the line with the conflicting driver.

If you haven't found the offending line yet, open the System.ini file. Perform the same procedure, this time placing the semicolons in front of any line within the [386Enh] section that ends in .386 except those lines that have an asterisk (*). If the problem is resolved, use the same process as above to locate the offending driver. Once you find the conflicting driver, contact the manufacturer of the driver to obtain an updated version or try leaving the semicolons in front of the conflicting driver. There are probably many drivers loading with your system that are never used. ■

by Jennifer Farwell

A flash fire. It happens when invisible fumes creep along your floor and make contact with a gas pilot light. So please make sure flammable liquids are tightly sealed and stored far away from gas appliances. For more information on home fire safety, see an Allstate Agent or call 1-888-ALLSFTY. **Being in good hands is the only place to be.**™

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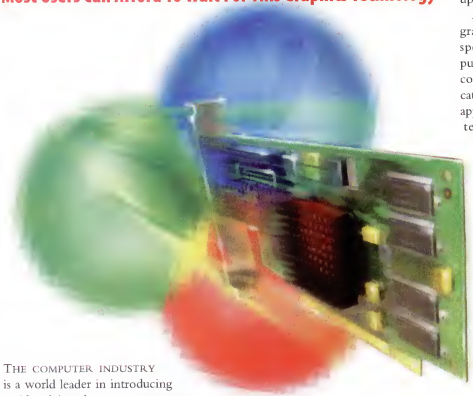
What's AGP To Me?

Most Users Can Afford To Wait For This Graphics Technology



THE COMPUTER INDUSTRY is a world leader in introducing and bandying about new acronyms, most of which leave their real names behind and remain mysteries to the new user.

One of the latest is AGP, which stands for **Accelerated Graphics Port**. This new **bus** (a PC's main data highway) interface delivers high-performance graphics, including better three-dimensional (3-D) imaging. The AGP bus accomplishes this by shouldering the entire graphics burden and directly connecting to the main system memory through a high-speed connection. While improved graphics appeal to almost everyone, a closer look at AGP technology shows that, for now, it's an immediate, must-have upgrade mainly for the real "players."

On The Bus

Today's computers come with **Personal Component Interconnect** (**PCI**) buses on their motherboards. PCI is the Intel bus standard that provides a way for fast communication among the system's central processing unit (CPU) and peripheral components. The bus pathway ends in a slot, where the insertions of expansion cards, such as video, sound, and graphics cards, and other peripherals occur. Information from these items passes through the system's main random-access memory (RAM) bank and over the PCI bus. Like commuters slugging it out on the freeway, each peripheral contends with the others for valuable PCI **bandwidth** (a data connection's capacity for carrying data.)

Most graphics accelerator cards today plug into PCI slots. Such adapters speed up the production of images on-screen because they contain a processor and usually about four megabytes (MB) of built-in memory for handling basic drawing functions. With these specialized components at work, the CPU is free to run other programs, and the graphics card has less need to contact other parts of the system. These twin advantages speed up overall system operation.

Although the separate on-board graphics memory gives computers a speed boost, developers constantly push the technology envelope by incorporating bigger and more complicated images into applications. When applications become more graphics-intensive they need even more bus bandwidth and memory to display each screen as it should appear. The bottleneck returns.

AGP offers relief with a high-bandwidth, direct connection to the computer's main bank of RAM. Graphics data is channeled away from the main PCI bus to its own bus dedicated to graphics only. The purpose is to let developers of 3-D applications store more complicated images using on-board card memory and the computer's RAM, which reaches 16MB to 64MB on the average home machine. Access to all this memory gives the graphics card room to sort increasingly complicated 3-D information and toss it up on-screen faster than ever before.

AGP & PCI

AGP operates at a minimum clock rate of 66 megahertz (MHz), compared to the average PCI slot that typically runs at 33MHz. This means AGP 1X transfers data at more than 256 megabytes per second (MBps), whereas PCI tops out at 132MBps. Most computer systems released this year will support the new AGP 2X standard, which transfers data at nearly twice the other rate, or 512MBps. AGP is expected to reach transfer rates of 1 gigabyte per second (GBps) by next year. This kind of speed promises to move graphics information among the CPU, memory, video card, and screen fast enough to generate better 3-D performance.

Illustration, Matt Morrow

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Despite this drastic speed improvement, AGP technology isn't designed to replace PCI; it acts as a supplement. With the memory-intensive graphics information transfer removed from the PCI bus, other PCI devices should experience better operation because of access to substantially more bus bandwidth.

Reflecting this teamwork, new PCs shipping with AGP continue to feature PCI slots, and PCI also will operate as the main input/output bus into the future. Generally AGP motherboards have one AGP slot, which takes up one of the spaces usually reserved for a PCI slot. Although the AGP slot's shape and size are similar to PCI's, it is distinguishable. The AGP slot uses a separate connector and is further from the motherboard's edge than the PCI bus.

No Easy Upgrade

One impetus behind Intel's development push was to bring high-performance graphics to more consumers at a manageable price. Intel wants 3-D and other intense graphics to play well on mainstream machines. This may be true, but since the technology's design is for use with the Pentium II Slot-1 motherboards, most users plugging along on machines running standard Pentium processors are in for a costly upgrade (see sidebar). Because the AGP connector is different from the PCI, you cannot upgrade PCI systems without replacing the entire motherboard.

That doesn't mean you have to replace the processor. AGP is optimized for the Pentium II, but will work with other systems. **Socket-7** motherboards, the standard that accepts older Pentiums as well as chips from AMD and Cyrix, are available with AGP-compatible chipsets. Companies such as Cyrix are integrating AGP functionality into their processor designs as well, a move sure to decrease prices for AGP-seeking consumers.

Whichever processor and motherboard combination you choose, an operating system switch may also be in order. Windows 98 (Win98) is the only operating system to offer full, built-in support for AGP hardware. AGP and the Pentium II processor weren't around when Windows 95 (Win95) was released, and that operating system doesn't offer support for the technology. Intel released a virtual device driver and additional patches for Win95 to compensate for this problem, but the difficulty inherent in trying to make it work may be beyond AGP's benefits.

Who Needs It?

Avid game players in particular should receive the most benefit and are likely to drive early AGP purchases. Most intense action games depend on realistic 3-D images to make play more exciting. While standard PCI graphics cards offer 3-D capability, AGP offers graphics texturing, layering, and other eye candy, allowing for better and bigger games.

While not every advantage to AGP is for interactive games, the bottom line is this technology currently is about high-performance, 3-D graphics capabilities. There are few 3-D effects in word processing or spreadsheet programs, so the benefits for the average home-office or small-office user are debatable at best.

On the other hand, if you have a new AGP bus taking over graphics, it will free up more PCI bandwidth to tackle other expansion card duties. Eliminating the bandwidth bottleneck should generate more efficient performance from devices such as network adapters and modems, and other PCI devices.

Although the main thrust of AGP technology seems aimed at the graphics and gaming markets, productivity-oriented users with a new computer already on their wish lists would be wise to include AGP systems in their picks. Most new systems will include support for AGP by year's end, and increasing numbers of software applications will take advantage of this new standard.

AGP is here to stay, so typical home or small-office users are better off waiting until they need a new system or an upgrade to obtain AGP. The benefit of less strain on PCI slots isn't enough to pull out the pocketbook just yet. ■

by Anne Steyer Phelps

Upgrading To AGP

So you want to add an Accelerated Graphics Port (AGP) to your computer setup? Get the wallet ready because it's going to cost you.

Users starting out with a machine running a standard Pentium processor will need to replace not only their video cards but their motherboards. It's possible to buy Pentium motherboards with AGP ports, but the technology works better with newer processors such as the Pentium II.

If you want to upgrade your current PC, however, plan on buying a Pentium II motherboard and central-processing unit (CPU). Cheap motherboards start around $100 to $150, and the Pentium II processor itself costs at least $270. If your computer is a couple of years old, its case may not fit the upgraded components, which means plunking down another $50 or $70 on something to hold the new equipment. Then, of course, you also need an AGP video card, which costs $50 and more.

The outlay comes out to at least $500, assuming you can use the other parts from your old computer. While AGP provides a better three-dimensional environment, it's not worth that price. The best solution is for users to look for an AGP motherboard when buying a new computer, while owners of existing machines don't need to worry about AGP yet. ■

Hard Drives' Hidden Storage

Good Drive Management Reveals Megabytes You Never Knew You Had

RUNNING OUT OF HARD DRIVE space can be one of the most frustrating (and in some cases, dangerous) events in a computer user's experience. As a drive's last few bits fill up with a document you're trying to save, your applications grind to a halt and you may even lose data. When this cup runneth over, it runneth into a wall. You can prevent such problems with a myriad of techniques that free up space and make sure you don't approach that dreaded "full" mark.

From deleting unneeded files to compression tactics to buying a new hard drive, we'll walk you through your options for obtaining the most from your hard drive space. But remember, be careful when cleaning house. A good rule is if you don't know what something is or how to replace it, don't delete it. A couple of extra megabytes (MB) of space don't matter much if your PC doesn't work.

Keep It Running Smoothly

Basic maintenance with the ScanDisk and DEFRAG utilities built into your operating system can keep your hard drive running smoothly and ensure your PC is making the most of its space. To run ScanDisk in Windows 3.x, first exit to DOS and then type **scandisk** at the prompt. In Windows 95 and 98 (Win95 and 98, or Win9x), you can run ScanDisk by selecting Start, Programs, Accessories, System Tools. ScanDisk is a built-in utility that will, as the name implies, scan your hard drive for errors and correct those it finds. ScanDisk also can recover lost space that is being held by unnecessary or redundant data. In Win98 and most versions of Win95, ScanDisk will automatically run if there is a problem with your PC and you have to perform a **cold reboot** (shut the PC off and turn it back on).

DEFRAG will **defragment** your hard drive, rearranging blocks of information in a more efficient (and space-saving) order. You should run DEFRAG at least once a month. To defragment your drive in Windows 3.x, exit to DOS and type **defrag** at the prompt. DEFRAG is also available under System Tools in the Start menu in Win9x.

Under the same menu option in Win9x, you can choose Scheduled Tasks and set up times when ScanDisk or DEFRAG will run automatically, letting you take care of these time-consuming activities while you're away from the PC.

Recycling Program

One of the fastest and easiest ways to free up disk space is to empty the Recycle Bin. Just because a file is deleted in Win9x, doesn't mean it's gone. It will sit in the Recycle Bin forever if you let it. Right-click the Bin and select Empty Recycle Bin from the pop-up menu to throw the trash out permanently.

Cache If Cache Can

Your World Wide Web browser enhances your Internet speed by caching often-used files. **Caching**, in

this instance, means setting aside graphics and Web pages you visit on your hard drive. The next time you visit them during that Web session, they'll load quickly from the hard drive rather than taking the slow journey across the Internet from a Web site.

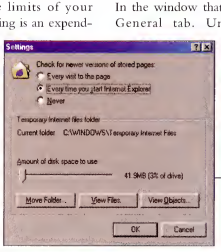
But the browser's efficiency can grow troublesome because it will take up as much hard drive space as it's been allotted. This may not be a problem if you have several gigabytes (GB) on your drive, but if you're butting against the limits of your drive's capacity, caching is an expendable luxury.

To decrease your cache in *Netscape Navigator 3.0* and older, choose Network Preferences from the Options menu. In the text field after Disk Cache, enter a new amount of hard drive space that you allot to the browser for caching. It's represented in kilobytes (KB), so if it says 8,000, you can drop it down to 2,000 and save 6MB of space. If you're using *Netscape Communicator*, select Preferences from the Edit menu. In the Preferences window that appears, click the plus sign in front of Advanced in the left column. Now click Cache to bring up the caching settings. There you will find Memory Cache and Disk Cache. You don't have to worry about Memory Cache at this time (it is information that is cached in your random-access memory, or RAM), but you can modify Disk Cache however you wish.

Click the Clear Disk Cache button to wipe the hard drive browser cache clear. Or, you can enter a new number in the text box after Disk Cache. If your browser is currently using 7MB of hard drive space, just change that to a lower number to save space. If you have more than one drive and your C: (or main) drive is getting too full, you can change the cache folder to your D: (or alternate) drive by entering a new path in the text field after Disk Cache Folder.

If your browser is *Microsoft Internet Explorer 3.0* or older, select Options from the View menu and then click the Advanced tab. Slide the bar underneath Amount Of Disk Space To Use to the left to decrease the size of the cache you're using.

If you have Explorer 4.0, select Internet Options from the View menu. In the window that appears, click the General tab. Under Temporary Internet Files, you can click the Delete Files button to clear the cache or the Settings button to change your caching preferences.



Shrinking your browser's cache size can be a safe and easy way to free up several megabytes of space.

In the Settings window, you can slide the bar underneath Amount Of Disk Space To Use to the left to save space. You can change the cache folder by clicking the Move Folder button and reassigning its location. You also can view the files that are in the cache by clicking the View Files button. Another interesting option is the View Objects button. Clicking it will bring up the Program Files you have downloaded and let you know their status. If they've already been installed, then it's safe to delete them, freeing up additional space.

Temp Files

There's a reason these files earned their "temporary" name. It's OK to toss them when you (or Windows) are through with them. Many of these are easy to find and delete, but others will require a little digging on your part. A good place to look for temporary files is in the aptly named TEMP folders. There will usually be a TEMP folder in your root (or C:) directory. Any files you find in here are fair game to be eliminated. (You'll probably be unable to delete a handful of these files because they're in use by the current computing session.)

Using File Manager in Windows 3.x, click C: (or whatever is your root directory) and then click the TEMP folder to open it. Highlight the files (and/or folders) you want to delete in the window to the right. You can do this one at a time by holding down the CTRL key and clicking each file, or you can click the first file in a series that you want to delete, hold down the SHIFT key, and then click the last file in the series. Now select Delete from the File menu (or press the DELETE key) and then click OK at the prompt.

Note that if you delete a file in Windows 3.x's File Manager, it doesn't travel to any Recycle Bin; it's pretty much gone. If you realize right away that you might need the file back, try the File menu's Undelete option. Depending on how much drive activity has gone on since the deletion, the file may not be retrievable with this tool.

In Win9x, double-click My Computer, double-click your root drive (most likely C:), and then double-click the TEMP folder. You can highlight files (use the CTRL or SHIFT keys to get more than one at a time) and then press the DELETE key or select Delete from the File menu. If you want to remove all the files, choose Select All from the Edit menu and then press DELETE.

In addition to the main TEMP folder in the root directory, check in the WINDOWS folder for another separate folder also named TEMP. Eliminate the files in this folder just as you did files in the main TEMP folder.

Single files. Many other unnecessary files are scattered about your hard

drive, but you should be much more careful about eliminating them than you were with the files in the TEMP folders. Most of the single files are ready for the Recycle Bin, but some may be useful files that simply appear to be trash. Sorting through these files will be much more difficult, and risky, than simply dumping the TEMP folders. We recommend only eliminating these files if you are in dire need of space.

You can use the Find feature in Win9x (and the Find option in Windows 3.x's File Manager) to locate unneeded files. In Win9x, click the Start button, select Find, and then click Files or Folders to bring up the Find window. Before you begin your search, make sure the field after Look In contains the name of the hard drive you want to search and the box in front of Include Subfolders is checked. You want to make sure your search covers the entire drive. Now enter your search item in the field after Named. To find all files with the .TMP suffix (which stands for "temporary" and marks the file for deletion), enter ***.tmp** and click Find Now. After Find has scoured your drive for files with this suffix, you can choose Select All from the Edit menu and then Delete from the File menu (or highlight them one at a time with the CTRL option).

In File Manager, select Search from the File menu and use the same punctuation to find temporary files. Typing ***.tmp** will find all the files with that extension.

Other suffixes that indicate potentially deletable files include .OLD, .BAK (for "backup;" be careful with these because they may not be needed now, but they could be in the future), .ZIP, or sometimes .EXE. The .ZIP suffix indicates files that have been compressed. Most of these are archives that have been downloaded from the Internet. Once the archive has been uncompressed and the files inside used, then the archive is no longer needed. The same goes for .EXE, or executable files, used in installing programs (but not those that actually run programs).

If you've the space, it's nice to have these .ZIP and .EXE files on hand in case something goes wrong with the programs or extracted files, and you should at least keep them backed up in another place. But if space is at a premium, eliminating them from the hard drive is a good way to free it up. Examine these files carefully before deleting to make sure you're not eliminating something you'll need.

Add/Remove Programs

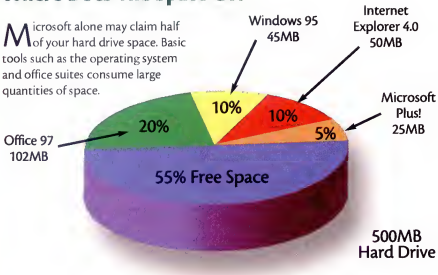
An excellent way to release that choke hold on your hard drive is to remove unused programs. In Windows 3.x, you'll have to do this manually unless the application comes with an uninstallation program (in which case, you just run the uninstaller; check the program's folder). This means deleting the folder the program occupies. This will leave behind system and other shared files in the WINDOWS directory, but beginners don't really want to mess with digging those out, and the simpler process will free up the lion's share of the space.

In Win9x, you can use the Add/Remove Programs application to obtain a more complete uninstall (as always, use the uninstallation abilities of the program itself first, if this is an option). Double-click this icon in Control Panel, click the Install/Uninstall tab, select the program you want to nix, and then click the Add/Remove button. Windows will get rid of as much of this program as it can.

Third-party programs. You also can look into brand-name uninstallation software such as Symantec's *Norton Uninstall Deluxe* ($39.95, 800/441-7234, 541/334-6054, http://www.symantec.com). While they will cost you, these programs provide a more thorough removal of unwanted applications and feature other hard drive cleaning abilities, such as automated searches for unnecessary files.

Where Does The Space Go?

Microsoft alone may claim half of your hard drive space. Basic tools such as the operating system and office suites consume large quantities of space.



Compression Theories

You hear much talk about using compression to make file transfers more viable over the Internet. But file **compression**, storing files in a more compact way, also can be used to save hard drive space within a PC. By using operating system tools such as DriveSpace (there's a version for every kind of Windows, even a Doublespace for DOS), you can compress your entire hard drive and obtain major increases in the amount of available space. Since all your applications and data are compressed, it makes your drive "bigger."

But the problems of large-scale hard drive compression outweigh the benefits. For starters, the performance degradation is highly noticeable. PC's must decompress files before using them, introducing a new step in the file-access process that can hobble a speedy PC. In addition, if something goes wrong with the single compression, all the data on the drive could be lost.

Fortunately, there are other ways to take advantage of compression without placing your PC at as much risk. One option is to compress rarely used data into archives that can be set aside on your drive. An excellent utility for this type of archiving is Nico Mak's *WinZip* (available at http://www.winzip.com). After you download and install the executable file, you can use WinZip to browse your hard drive, select files you want to "zip" away, and then place them in archives of as many files as you want. Compression is especially useful with graphics files, which can be reduced to a fraction of their former size. Just create a folder with a name that's easily recognized, such as "Archived data," and then horde your info safely and efficiently.

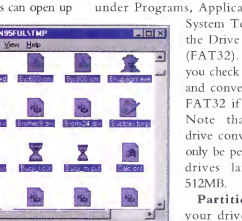
Leave It On The CD

During installation, Win9x often places a good chunk installation files, tutorial movies, and other information on your hard drive. While this is a good thing because the files are more accessible and run faster when placed on the hard drive, it's a bad thing when you're trying to conserve space.

For example, if your Win95 system includes a WIN95 folder on your C: drive that's full of **.CAB files** (compressed pre-installation files), it's a folder full of information you can obtain from the Win95 CD-ROM. You can delete this folder and free up some space. (*NOTE: Do not confuse this folder with the WINDOWS folder, which houses vital system files for your PC.*)

In addition, Win95 may throw some sample movies onto your hard drive (they'll run much more smoothly from the hard drive than from the CD-ROM). Use the Find option in the Start menu to search for ***.mov** to locate them. Eliminating these files, if they're there, can make more room for normal files.

Depending on your installation of Win98, you may have opted for it to save your Win95 settings. If so (and if you have no desire to go back to Win95), deleting these files can open up around 50MB of space. Open Add/Remove Programs in Control Panel, click the Install/Uninstall tab to bring up that window, highlight Windows 95 Files under the list of removable software, and click the Add/Remove button.



Your TEMP folders often consume drive space with unneeded files that are safe to delete.

FAT16 Or 32

Depending on the operating system you're using, your hard drive will be organized with either a 16- or 32-bit **File Allocation Table** (**FAT**), which the operating system uses to keep track of information on the hard drive. Starting with Windows 95b (or OSR2), Microsoft introduced FAT32, a much more efficient way of storing data on a hard drive. With FAT16, data is stored in much larger blocks on the drive. For example, if you store a 3KB piece of information into a 32KB block on a FAT16 drive, you're wasting 29KB of space because these blocks can hold only one piece of information. On the other hand, if you store the same 3KB piece on a FAT32 drive, it will be placed in a 4KB block, only wasting 1KB of space.

You can determine how much FAT you have by right-clicking your hard drive icon and selecting Properties from the pop-up menu. On the General tab, if it says FAT32 after File System, that's what you have. Otherwise, it's FAT16.

If you're running Win98 and still have FAT16 on your drive (or you're adding a new drive with only FAT16), you can upgrade the drive with Win98's FAT32 Drive Converter. In the Start menu, under Programs, Applications, and System Tools, select the Drive Converter (FAT32). It will let you check local drives and convert them to FAT32 if you wish. Note that FAT32 drive conversion can only be performed on drives larger than 512MB.

Partitioning. If your drive still uses FAT16 and you want to store data more efficiently, you can **partition** the drive, or break it into smaller segments. These smaller segments each use smaller blocks to store data than the drive as a whole, making storage more efficient. For the most convenient partitioning, you should obtain a third-party package, such as Power Quest's *PartitionMagic* ($69.95, 800/379-2566, 801/437-8900, http://www.powerquest.com) to separate your drive in this manner. As in FAT32 conversion, partitioning is only worth it if your drive is larger than 512MB.

Option To Buy

If freeing up 10MB here and another 100KB there isn't enough room for you, plummeting prices for new hard drives make adding a second drive a feasible option. Shop around for a good price on a large drive (http://www.pctoday.com is a great place to start for price comparisons) and see whether you can find one that will fit your needs as it expands your hard drive horizon. ■

by Joel Strauch

Learn Microsoft Access 95 & 97

Handling Forms & Finding Data

Brad Goldschuh

UNDERSTANDING THE STEPS that go into a database plan can help you better understand *Microsoft Access* and the concept of a database—which will ultimately make your job easier and more rewarding.

Hopefully, you spent the days between last month's article and this one, the second of a three-part series, nosing around in your Access software and thinking about what comes next. For those of you who started creating a database last month, it's time to start the program and open the database.

Entry In A Table Datasheet

Open your table by selecting the Table tab in the Database window and then clicking your table and the Open button. When the Datasheet View opens, the blinking insertion point is in the first row, first column, positioned either before the first character or with the first field selected. Entering new data requires you to move to a blank line before typing. Take care not to type over existing data! Remember, data entry in Access is **transactional**, meaning new or edited records save when you move off the record in any direction.

You can temporarily remove existing records from the screen by opening the Records menu and selecting Data Entry. This ensures that you don't type over existing data. The next time you open the table datasheet, all the records will display together.

If you prefer to see all the existing data, look for an asterisk (*) in the left margin of the datasheet; it indicates the next available record. Next, scroll or use the mouse to get to the next blank row. At the bottom of the window, a navigation bar showing the current record number and two sets of left- and right-pointing arrows allows navigation to any record in the table. Use the inner set of arrows to move to the previous or next record and the outer set to move to the first or last record. Click the arrow with the asterisk button (on the navigation bar or the toolbar) to move to the next available, empty, record.

(*NOTE: If you begin typing in a new record that contains a primary key field, which uniquely identifies each record in a table, you will not be able to get off the record until you enter a value in that field. If you began a record by mistake, enter a value in the primary key field, then move off the record and delete it.*)

To delete a record from the table, click in the left margin of the datasheet when you see your mouse pointer turn into a fat, black, right-pointing arrow. Click your mouse button. This will select the entire record. You then can press DELETE on your keyboard to get rid of the record. When Access prompts you with a message asking you whether you're sure, click Yes to complete the deletion.

AutoForms For Data Entry

A **form** is a database object for displaying, editing, and entering data into a new database. A form acts as a window to data in underlying tables, letting users view fields in a pleasant, easy-to-read format. The term **underlying** as applied to tables means that ultimately, the data you enter in a form becomes part of whatever table the form comes from. If you delete the form later on, data entered remains in the table. You can think of the tables in your database as "master" data; every other Access object bases itself on and uses the master data.

The easiest way to create a form in Access is to use an AutoForm. Access generates a simple, columnar form based on a selected object. The selected object is whatever item you have selected in the database window. The form displays one record at a time, with field names on the left and text boxes on the right.

Open your database and click the Table tab in the database window to ensure that the table names show. Click once on your table. Next, go to the Insert menu and select the AutoForm command. A form window opens, displaying the newly created object. The form size

depends on the width of the widest text box and a depth to fit the number of fields. To ensure that the form properly fits in a window, click Window in the menu bar, then select Size To Fit Form.

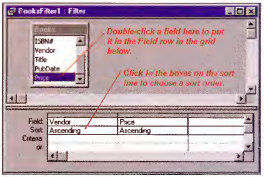
The form displays the first record in the underlying table. At the bottom of the form window, its navigation bar shows you the displayed record's number. Changing the number alters which record you view in the form. To type a new record, click the arrow button with an asterisk in the navigation bar.

The new record contains zeros in the number or currency fields. The word [Counter] or [AutoNumber] shows where that type of data belongs to a field. Other field text boxes should be blank. If you see any text or other data, you might not be on the next, blank record. Do not type over existing data.

You enter data in the form by typing in the text boxes to the right of the field names. To advance to the next text box, press ENTER or TAB. You do not enter data in fields that contain [Counter] or [Autonumber]; advance past those text boxes. When you reach the bottom of the form (the last field for that record), pressing ENTER or TAB advances you to the next record.

The left side of the form contains a vertical bar with an indicator arrow. When data entry or editing takes place, the arrow becomes a pencil, which indicates that saving did not yet take place. Advancing to the next record restores the indicator arrow and saves the data in the current record to the underlying table. This transactional method of saving data is the same for all Access objects.

You can choose to save or discard the AutoForm you created. If you don't make changes to the form design, and don't need to save it for others to use, simply close the form and when prompted to save, click No. The next time you do data entry in your table, you can simply have Access generate a new AutoForm. To save the form, open the File menu and choose Save. In the Save As dialog box, type the desired



This filter window created in *Access 97* shows the name of the current table followed by the word Filter1:Filter at the top.

name of the form and click OK. It's a good idea to include the name of your table in the form's name. After saving, the form remains on-screen. Close the form window. Click the Form tab in the database window and observe the newly created form object.

Types Of AutoForms

There are three types of AutoForms: Columnar, Tabular, and Datasheet. A **Columnar** form displays one record at a time, with field names on the left and corresponding text boxes on the right. A **Tabular** form displays all the records in a table in columns and rows, with field names at the tops of the columns. The tabular style is similar to a datasheet in format, but on a form you can eliminate unwanted columns or add additional fields from other tables. The form style shows field names as labels and data values appear in text boxes. A **Datasheet** AutoForm looks like a table or query's datasheet.

To select one of the three AutoForm types, select the Form tab in the Database window, then click the New button. In the New Form dialog box, choose one of the three AutoForm types from the list. In the box below, choose the object to base the form on, then click OK. Unfortunately, you cannot select the form style from this area. The form style generated depends on the last style used. To change the form style, wait for Access to generate the AutoForm. Next, switch to Design View by opening the View menu and choosing Design View or Form Design (depending on which version of Access you have). In the design view, open the Format menu and click Auto-Format. Choose a style from the list, then click OK. Switch back to Form View if you plan to do any viewing or data entry.

Viewing The Form

Forms have three views: Form View, Design View, and Datasheet View. The left icon on the Form view toolbar makes the views accessible. (It is the button with the triangle and pencil icon.)

If the form is not open, in the database window click the Form tab. Select your form by clicking it. There are three buttons in the database window: Open, Design, and New. The Open button opens the selected object in Form View. The Design button opens the selected object in Design View. The New button opens the New Form dialog box, from which you can select options for creating a new form.

Click the Open button and observe your form in form view. Here you can add, delete, search for, or edit records of data in the underlying table. Click the Design view icon to observe the form design window. In this view, you can make alterations to the layout and style of the form, and add or delete items such as logos, colors, and additional text boxes. Click the Datasheet view icon to observe a table that includes all the field names at the top, with each record of data below. This datasheet is separate from the table's datasheet even though it displays the same master data. In this view you can edit, add, or delete data stored in the underlying table(s). If a form is very complex, it is possible that a datasheet view is not available.

(*NOTE: All changes to data made in a form object change the data in the underlying tables for that object. Ultimately, the tables contain the only set of data in the database.*)

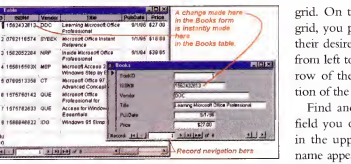
Find & Modify Data In A Form

Imagine you just received a list of products; that means revisions are

needed in your database. To make the revisions, you can search for the products by a unique value. If you decide to search your data by a field that does not contain unique values, you will have to make sure you're on the one you want. For example, if you have 10 "Mr. Smiths" in a table, and you search for "Smith," you must make sure you have the right Smith before making revisions.

To try the Find feature, make sure you have the correct form for the correct table open in Form View. Position the blinking insertion point in the field you wish to search by. On the toolbar, click the Find button (the binoculars). In the Find dialog box, type the value you want to find. You can search up or down from the insertion point, so it helps to begin the search while you are on Record 1 and choose to Search Down. You can search the field your insertion point is in or search the entire table. Searching is not case-sensitive unless you select Match Case. Searching Fields As Formatted is your slowest option, but you can find values based on what you typed, rather than what shows due to formatting. You also can specify whether the value you want to find is all the data in a field, part of the data in a field, or the beginning of data in a field.

Once you complete the dialog box, click Find First. Access finds the first occurrence of the specified value. To continue searching the same value, click Find Next. When you find what you need, close the Find dialog box. The form will have the value selected.



The *Microsoft Access* table, Books, on the left updates instantly when a change is made in the Books form on the right. The Books table is the underlying table for the Books form.

Sorting Data

Since records remain in their input order, they aren't always in the order you want. You can sort data by one field in a datasheet or form with just a click of the mouse. After sorting, you can scroll through records to make changes or print a datasheet for reference.

Open the a table in Datasheet View. Move your insertion point to the field you want to sort by. On the toolbar, there are two buttons for sorting: A-Z (Ascending) and Z-A (Descending). Click the sort button of your choice. The rearranged records in the datasheet are in order by your selected field. Try sorting again, this time with the Price field. You can sort the same way in a form, except that you see only one record at a time.

Sometimes sorting results in a tie. For instance, you might have a table with names and telephone numbers of friends. You just happen to have 10 friends with the last name "Green." When you sort your table by last name, you end up with all 10 Greens in a tied position. This means Access determines which Green is first by the original data entry order. To break the tie, you can choose to do a second level of sorting, putting the names in alphabetical order by first name. When you do this, it just so happens that you have three friends whose first name is "Barry." You managed to eliminate the seven other Greens from the tie, but now you need a third level to break the tie on Barry. Choosing a field that contains a unique value (for example, a Social Security Number) instantly breaks a tie.

To perform a tiebreaker sort, you must open the Records menu, scroll to Filter, then choose Advanced Filter/Sort from the submenu. This will open the Filter window.

The Filter window looks like a query design window. The top pane of the screen holds a box with the name of the underlying table and all its field names. The bottom pane contains a grid. On the first row of the grid, you place field names in their desired sorting hierarchy from left to right. The second row of the grid allows selection of the desired sort orders.

Find and double-click the field you originally sorted by in the upper pane. The field name appears in the first row's first box in the grid in the lower pane. Find and double-click the next field you want to sort by. The field name appears in the second box of the first row. The second field will be the tiebreaker for the first field.

Click in the second row of the grid, below the first field name. A drop-down list arrow appears. Click the arrow and select Ascending from the list. Do the same for the second field.

Apply the filter by clicking the Apply Filter/Sort button. If you later want to remove a filter, open the Records menu and choose Remove Filter/Sort.

What Comes Next?

Now that you've nailed down some of the technical aspects of using the table and form objects in Access, you should think about the database design. The database you began last month may need some revisions. The best time to make revisions is while you're still in the planning stage and no substantial data exists in the tables. Take another look at the tables you started.

The relational aspect of creating a database using a Relational Database Management System (RDBMS) makes it possible to reduce data redundancy to an absolute minimum. This means any time you see an area where data is being repeated in record after record, you need to consider whether it belongs in the current table or a different table.

Then, look for part three of this series next month to find out how relationships between tables make it possible to design queries that maximize database efficiency and output the results you need. ■

by Anne M. Shevrin

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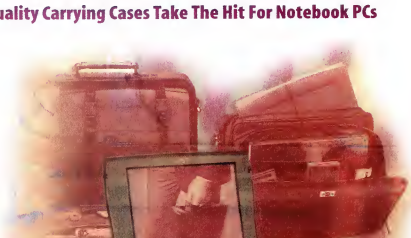
Portable PC Bodyguards

Quality Carrying Cases Take The Hit For Notebook PCs



THE MOST CRITICAL PART of your high-tech, portable-computing entourage may be the least complex item in the bunch. The low excitement factor of carrying cases certainly isn't proportional to their importance. One bad fall can send an expensive portable PC to its grave, possibly taking your stored projects and the success of your business trip with it. So why take the risk of not protecting your PC in a quality case?

If you're smart you won't take any chances—and you won't buy the first case that catches your eye. It's important to evaluate your needs. Will you carry your PC to the office everyday, tote it on occasional trips, or constantly drag it across the country? Will you take large amounts of support materials everywhere, or will a small, no-frills case that holds your essentials suffice? Will your typical handling of the computer require a little or a lot of protection? After answering these questions, you're ready to shop for a PC case.

Protection

Today's computer cases use three main methods of protection.

Foam padding is the most common method used, with the main case differences coming in the thickness and location of padding. Prices for these cases range from around $65 to more than $150. The main buying consideration is a simple one: Find a case that provides as much padding as possible. Check whether the padding protects all sides of the PC and make sure the padding is dense and of high quality.

A suspension system holds the computer in a sling inside the case, suspending the PC a few inches from the bottom of the case. In a fall, the sling cradles your computer to prevent damage. Port's ThinkPad Compact Case, $99, is designed specifically for an IBM ThinkPad PC and features the SafePORT Sling Suspension system. According to Port, this system provides as much safety for your computer as six inches of foam padding.

Air systems offer the most protection by securing the PC in a type of air-filled bag or pad. In a fall, the air inside the pad absorbs the shock. Some cases have handheld air pumps for adding air to or releasing air from the bag.

CODi Inc. offers an air-protection system in some of its cases, such as The Diplomat. This case can be purchased for $159 with the optional AirPRO system, which protects from drops of up to 6.5 feet, according to CODi. This system works by channeling air through six interconnected air chambers and 10 air channels. When you drop your case, the air in these chambers moves on impact from one chamber to another, distributing the force of the impact. The Diplomat incorporates the air pump into the case, eliminating carrying another accessory.

Good cases are made of water-repellent material that withstands inclement weather or spills. Many companies let customers choose between nylon and leather. Targus' Universal Notebook Case, priced at $119, is made of a new, durable material called Koskin that resembles leather. You should also check for other protective features such as durable stitching, non-slip straps and handles that are securely connected, and fittings made of sturdy steel, not plastic.

Check whether the case's interior protects the computer from other peripherals you're carrying. Most cases have dividers that keep accessories where they belong. Dividers that adjust to fit the exact size of your computer provide the best protection.

For personal digital assistants (PDAs) and handheld computers check out protective cases such as the Executive

Illustration Jim Mahaffey

PlayThru from Palm Tree Products Holding Corp. for $49.95. It's constructed of leather and zippered on three sides so you can use the PDA without removing it. Total Case Solutions offers the TCS Deluxe Executive PDA Organizer, which fits most electronic organizers, palmtops, and handheld PCs. This leather case consists of a main area, which holds your PDA, and an outside pocket that can house a cell phone or glasses. This $40.99 case even includes a larger pocket and a place to store your checkbook and additional cables.

Storage & Accessibility

Today's cases have pockets and compartments to store just about anything the mobile worker needs. There are massive cases with room for a computer, a portable printer, a ton of paperwork, and a change of clothes. Budget cases that hold just the computer and a few accessories for those who need to bring only the essentials. You even can opt for a case that works as a second skin for your computer, guarding it from spills and minor damage. The Tenba Brief Pak, $66, acts as a slip case that will easily fit into a briefcase, suitcase, or even another computer carrying case for extra protection.

Top-loading cases open from the top so the computer can be removed for work sessions. This style lets you easily file paperwork in compartments around the computer. It's also easy to slip things into and out of a top-loading case. A clam-shell design opens so the PC can be used while it (and other contents) remain in the case.

Backpack styles, which resemble a regular backpack and provide space to carry the computer, have grown in popularity. The design of cases such as the Back Pack Plus from The Protector is perfect for students and mobile workers who want to keep their hands free. The Back Pack Plus, available for $69.95, features a foam-padded compartment that fully opens for easy removal of the computer. It has a removable pouch for accessories, and its cushioned shoulder straps make it extremely comfortable to carry.

Space vs. Comfort

The obvious trade-off in cases is between ample storage and carrying a heavier case. Cases usually average around 3.5 to 4 pounds; your total load will also include anywhere from 4 to 10 pounds for your computer, plus peripherals and supplies. Even though a lighter load may sound more appealing, make sure your case satisfies your capacity needs and provides ample protection for your computer.

There's a lot to look for in cases such as this Port ThinkPad model. Key buying points include the size of storage compartments and the quality of PC protection technology.

Port's Mobile Plus Carrying Case is one of the larger cases available. It weighs 4.54 pounds, but its weight is definitely justified. The $129 Mobile Plus features an Air Cushion System to protect your PC, plus four large organizer pockets that hold just about anything the most prepared traveler needs.

Many companies cater to comfort with cases featuring padded and ergonomically designed shoulder straps and handles. The Targus Universal Notebook Case, $119, puts air pockets to work protecting you and your PC. An air protection system surrounds the computer, and an air pad inside the shoulder strap eases the pressure from the weight of the computer and case.

In addition to these physical factors, be sure to investigate the warranties and prices of the cases you're interested in. Depending on the case, you may end up paying anywhere from $50 to $350. Large cases, cases with air or suspension systems, and those constructed of leather will cost the most, while cases that are made of nylon and protect with foam are usually cheaper. Some companies may also offer or include extra security features, such as locking zippers, combination locks or name tags, that may be a top priority for you.

This is one purchase for which you'll rarely regret paying more for quality. It only takes one fall and one relieved glance inside the case at a healthy PC to justify the expense of a protective case that lives up to its name. ❚❚

by Sommer Jindra

For More Information

CODi
(800) 263-4462, (717) 540-1337
http://www.codi-inc.com

Palm Tree Products Holding Corp.
(781) 871-7050
http://www.palmcase.com

Port Inc.
(800) 242-3133, (203) 852-1102
http://www.port.com

The Protector
(800) 438-1012, (303) 939-8100
http://www.theprotector.com

Targus
(877) 482-7487 (toll-free)
(714) 523-5429
http://www.targus.com

Tenba
(718) 222-987
http://www.tenba.com

Total Case Solutions
(877) 789-0852
http://www.totalcase.com

Going Online

America Online's New E-mail Tools

- *Online*
- *Beginner*

AMERICA ONLINE (AOL) users who have not yet upgraded to the *AOL 4.0* software may want to consider the lengthy download just for the E-mail improvements.

Overall, the most noticeable changes brought by AOL 4.0 are in looks rather than features. Down in the E-mail department, however, things are different. Most of the buttons and commands work the same, but AOL has added some new tools that bring the proprietary software a few steps closer to the full-featured mail programs (or **clients**) enjoyed by users of smaller Internet service providers.

No Misspeelings

At the top of the list is a new spell check capability built right into the mail program. For users who are perhaps new to **spell checkers**, these little wizards scan through documents such as E-mail messages and alert humans to words that don't match entries in the program's dictionary.

To start the AOL 4.0 spell checker, first create a new message as usual. When you finish typing, click the button near the top-right corner that shows "ABC" and a check mark. The spell checker begins from the cursor's position, so if you just finished typing it might start at the end. When the spell checker reaches the bottom of the message, it asks whether you want to continue from the beginning of the text.

When the spell checker finds a questionable word, it presents an explanation of what may be amiss and suggestions for making things right. Use the buttons in the pop-up box to control the action. Skip tells the spell checker to ignore this potential mistake and move on to the next word. Skip All tells the program to ignore all errors of exactly this type, a feature commonly used for items such as last names the spell checker doesn't have in its dictionary. The Learn button actually puts a copy of such words into the dictionary so that they won't be flagged in the future.

Finally, Replace lets the checker substitute your word with one its suggestions. If the computer offers multiple suggestions, be sure to select the one you want with the mouse before you click the Replace button. If you don't like any of the suggestions, type your correction in the Replace With text area. The spell checker will continue, starting with the word you just typed in. The Replace All button causes multiple instances of the mistake to be automatically replaced with the selected suggestion.

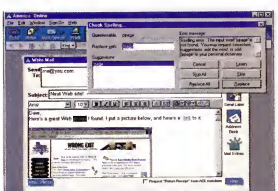
When the Spell Checker reaches the point in the document where it started, it lets you know with an OK button. Now your message should be free of obvious errors.

Getting Fancy

As you move the cursor over to click the Spell Check button, you might notice a couple of other new AOL mail features. The camera button lets you insert graphics into a message right along with text. The button with the heart inserts a link to one of the spots in your Favorite Places list.

To insert a graphic, you first must have one ready to send. Graphics can be computer pictures you've drawn or photographs that have been scanned in or taken with a digital camera. If you find such a file on your hard drive or other media, you can simply drag the icon into the body of your AOL E-mail message to have it appear alongside your text. Click the camera button to insert a picture by browsing files rather than dragging icons.

The camera button also gives you the option of inserting a background picture. These are pasted on the body field of the message; words you type appear over the graphic. This looks dandy if you pick a picture made up of colors completely different from your text.



***America Online 4.0's* new E-mail features bring the company's software more in line with the rest of the Internet world.**

Another addition to the mail toolbars is a Fonts menu. While AOL 3 let users dress up their text a bit through colors, boldface fonts, and italicized characters, AOL 4.0 provides access to the horde of fonts installed on your system.

AOL 4.0 users also will notice a revamped Address book, which displays your entries in alphabetical order and provides space to input additional information about people, including pictures. A person who forgets names but not faces will appreciate this touch, but we would guess few people obtain and scan in photos of their E-mail pals.

Taken together, these E-mail changes are welcome additions that make the new version of AOL's proprietary software well worth the big download. ■

by Alan Phelps

Microsoft Word 97

Inserting Clip Art

- *Word Processing*
- *Intermediate*
- *97 For Win95*

WHY LIMIT *MICROSOFT Word 97* documents to straight text when you can enhance them with eye-catching graphics? To insert an image, open the Insert menu and choose Picture, Clip Art (Insert, Picture, Clip Art), select an image category from the Clip Art tab, then click Insert. (You'll probably be asked to insert the *Office* CD-ROM during this process.) To find out more about the file before inserting it, click the Clip Properties button in the Clip Gallery dialog box before choosing Insert.

To resize a picture, click the image, then drag one of the handles surrounding the picture. To move the image to a new location, drag it to the desired spot. To adjust the way text flows around the image, right-click the graphic, then choose Format Picture from the pop-up menu. Click the Wrapping tab in the Format Picture dialog box, then choose a style.

To wrap text tightly around the edges of the inserted art clip, choose Tight, then click OK. To incorporate a bit of white space, choose Square, then click OK. If you choose Square, you also can decide how much space you want between the text and the top, bottom, left, and right edges of the image. The Tight style lets you adjust only the space between the left and right sides of the image's bounding box.

To add a border around an inserted graphic, click the image to select it, click the Drawing button on the Standard toolbar (or choose View, Toolbar, Drawing), then choose a line color for the border from the Line Color pop-up menu. You also can select a line style from the Line Style pop-up menu. To fill the bordered box with color, click the Fill Color arrow on the Drawing toolbar, then choose a fill color from the palette.

More Clip-Art Options

When you choose Insert, Picture, Clip Art, Word 97 gives you the option of inserting Windows Metafile Format (WMF) images stored on your hard drive in the PROGRAM FILES\MICROSOFTOFFICE\CLIPART\POPULAR folder. If you insert the Office CD-ROM before choosing the menu option, you get more options because Word incorporates images from the CD-ROM's CLIPART folder.

Word 97's **large clip-art library provides ready-made images that you can drop into documents for quick improvements.**

The Office 97 clip-art folder includes Graphics Interchange Format (GIF) and Joint Photographic Experts Group (JPG) images, in addition to WMF graphics. It also includes additional movie (.AVI) and sound (.WAV) clips in the MMEDIA folder.

To add JPG images, check out the contents of OFFICE\CLIPART\PHOTOS. To install additional clip-art images on your hard drive, double-click the Setup.exe icon in the OFFICE\CLIPART folder. This launches the Microsoft Clipart Extra Setup installation, letting you install either clip-art thumbnails or actual images to your hard drive. If you do a Custom Clipart Extra installation, you can choose which clip-art components to copy.

Adding Converter Filters

If you choose Insert, Picture, From File, then click the down arrow beside Files Of Type in the Insert Picture dialog box, Word lets you insert several graphics files in your document. Supported formats include Enhanced Metafile (.EMF), JPG, Portable Network Graphics (.PNG), Windows Bitmap (.BMP), and .WMF. If you want to insert Kodak PhotoCD (.PCD), PC Paintbrush (.PCX), or Tagged Image File Format (.TIF), and these options don't appear on the Files Of Type list, you must rerun the Word 97 Setup to install PCD, PCX, and TIF graphics filters.

Exit Word 97, click Start, Settings, Control Panel, then double-click Add/Remove Programs. Select Microsoft Office 97 or Word 97 from the list, then click the Add/Remove button. Insert your Office or Word 97 CD-ROM, then click OK. Click the Add/Remove button, scroll the Options list, select Converters and Filters, then click the Change Option button. Select Graphic Filters in the Options window, click Change Option, then click the box to the left of the graphic filters you want to install. Click OK, click OK again, then Continue. Setup will add the missing components. Now when you choose Insert, Picture, From File, the added graphics filters will appear on the Files Of Type drop-down list. ■

by Carol S. Holzberg, Ph.D.

WordPerfect 6.1

Adding Watermarks To Documents

- *Word Processing*
- *Intermediate*
- *6.1 For Win*

HAVE YOU EVER WANTED to add a subliminal message to a letter? Perhaps you want to make your documents appear more sophisticated by including a faint copy of your company logo behind the text.

WordPerfect's watermark feature lets you add drawings, charts, logos, graphics, or text behind document text. The watermark usually is printed in light shades so it adds to a message without hurting readability. Watermarks function like headers and footers in that they are set up as A and B and you can use two watermarks on alternating pages. A document can have several Watermark As and Watermark Bs, but WordPerfect allows only two active watermarks on a single page.

When you create or edit a watermark, you can access many of the available functions in the normal document window. These include:

- Creating tables or text columns.
- Changing font styles and point size.
- Cutting, copying, and pasting text.

To create a watermark, place the insertion point where you want the watermark to first appear. Open the Format menu and choose Watermark (Format, Watermark) and select either Watermark A or Watermark B. Then choose Create. An empty full-page document will open where you will create the watermark. The watermark feature bar will appear at the top of the screen. Choose Pages from the feature bar and select the pages on which you want the watermark to appear (odd pages, even pages, or every page).

You can create a watermark by typing text. To retrieve an existing file, choose File from the watermark feature bar, select the file, and click Insert. Choose Yes when asked whether you want to insert the file into the current document.

To retrieve a graphic, choose Image from the watermark feature bar, select the image file, and choose OK. If you retrieve a graphic, the graphics feature bar appears. Use it for changes such as resizing or adding a border to the image. Click Close to exit.

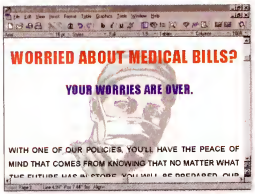
Choose Close from the watermark feature bar to return to your document. Watermarks do not display in Draft view. If your watermark is not displayed, select View, Page or View, Two Page to view it in your document.

Editing

When you edit a watermark you must position the insertion point on the page containing the watermark you want to change. You can have two watermarks on a page, so you will be prompted to specify which watermark (A or B) you want to edit.

One editing adjustment you might have to make is changing the watermark's shading so it doesn't overpower the text of the document. Choose Format, Watermark; select Watermark A or B; and then click Edit. Choose Shading from the watermark feature bar and specify a shade percentage for the text and/or image other than the default shading of 25%. Choose OK, then Close to return to your document.

You can rotate, flip, or move watermark images. Place your insertion point on a page containing the watermark you want to edit. Choose Format, Watermark and then select Edit. Choose Graphics, Edit Box from the main menu to display the graphics features bar. From there, you can add a caption; change the content, position, or size; make adjustments to word wrap; or add a border and/or fill style. Select Tools to display the Tools palette and use the tools to adjust your graphic image. Select Close when done to return to your document.


WORRIED ABOUT MEDICAL BILLS?
YOUR WORRIES ARE OVER.
WITH ONE OF OUR POLICIES, YOU'LL HAVE THE PEACE OF MINE THAT COMES FROM KNOWING THAT NO MATTER WHAT

Enhance your documents by inserting text or graphics as watermarks behind the text.

Discontinuing & Deleting

Discontinue a watermark at any point in your document by placing the insertion point where you want it discontinued. Choose Format, Watermark; select Watermark A or B; and click Discontinue. The watermark will be turned off for the rest of the document.

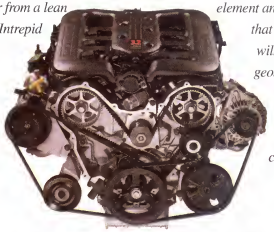
You can place a watermark at the beginning of your document and use Suppress to keep it from appearing on a title page, the first page of a chapter, or any other single page in your document. Position your cursor on the page on which you want to suppress the watermark and choose Format, Page, Suppress. Select Watermark A or B and choose OK.

Delete watermarks by selecting View, Reveal Codes. Locate the code for the watermark you want to delete and drag it out of the Reveal Codes window. You also can position your cursor before or after the code and press the DELETE or BACKSPACE key. ■

by Diane Kaye Walkoviak, M.A.

Conceived by an artful designer and exactingly rendered by sophisticated electronic tools, Dodge Intrepid's aerodynamically taut sheet metal stretches smoothly over one of the most advanced examples of cab-forward architecture yet developed.

Under the short, sloping hood, an available aluminum multi-valve powerplant generates a stout 225 horsepower from a lean 3.2 liters of displacement. The Intrepid standard engine – a twin-cam aluminum wonder – produces 200 horsepower from just 2.7 liters. More power per liter than any other regular-fuel V-6 engine available today.



In the Intrepid ES cockpit, large, white analog instruments and a wrap-around console with AutoStick® shifter suggest that this is a place for serious driving. A fully independent suspension and fat tires on 16-inch aluminum wheels indicate that the suggestion is more than cosmetic. A remarkably rigid body/chassis unit – developed through extensive use of finite element analysis – helps ensure that the suspension will maintain correct geometry when the automobile is driven with enthusiasm. Dodge Intrepid. This changes everything. Again.

The stuff that makes it cook is even more advanced than its look.

Intrepid The New Dodge

1-800-4-A-DODGE or www.4adodge.com

Always use seat belts. Remember a backseat is the safest place for children.

Lotus 1-2-3 5.0

Hide & Protect Data

- *Spreadsheets*
- *Intermediate*
- *5.0 For Win*

ALLOWING SOMEONE ELSE to access and enter information into one of your *Lotus 1-2-3* worksheets is a delicate situation. When another person is using your files, you want to protect your information and formulas against accidental erasure or modification.

Sealing, or protecting, a file prevents changes to cell contents, styles, and settings. When you seal a file, others can open the file. Unless users know your password, however, they cannot change the file's data. (Unless you have left certain ranges unprotected.)

When you seal a file, you deactivate certain actions. You cannot show hidden worksheets and columns or insert or delete rows, columns, or worksheets. You also cannot change column width, row height, page breaks, formats, alignments, styles, or drawn objects. If you need to do any of these, you first must unseal the file.

Sealing & Unsealing Files

Open the file you want to seal. Choose Protect from the File menu (File, Protect) to display the Protect dialog box. Under File Protection, select the Seal File box. Click OK. You will be prompted to enter a password, which can include up to 15 characters. Press the TAB key, enter the same password in the Verify text box, and click OK.

It's critical to remember the password used to seal a file because you cannot unseal the file unless you use the correct password. Passwords are case-sensitive, so you must remember the exact combination of uppercase and lowercase letters you used to create the password.

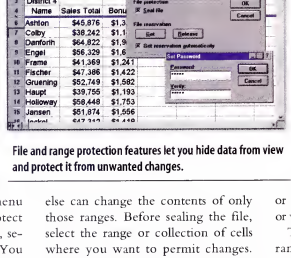
You might need to unseal a file to input changes. To unseal a file open it, chose File, Protect, deselect the Seal File box, and click OK. Enter the password for the file and click OK to unseal the file. You can reseal the file by following the steps described above.

Leaving Ranges Unprotected

You can seal a file with some cell ranges left unprotected so someone else can change the contents of only those ranges. Before sealing the file, select the range or collection of cells where you want to permit changes. Choose Style, Protection and select the Keep Data Unprotected After File Is Sealed box. Click OK and then use the Protect command in the File menu to seal the file. The unprotected ranges will appear in a different color.

After you seal the file, the status bar will display "U" when the cell pointer is on an unprotected cell and "Pr" when it is on a protected cell.

If you have an unprotected range you want to reprotect, you must first unseal the file. Then select the range you want to protect. Choose Style, Protection and deselect the Keep Data Unprotected After File Is Sealed box. Click OK and then use File, Protect to reseal the file.



File and range protection features let you hide data from view and protect it from unwanted changes.

Hiding Data

To keep people focused on the data they need to be working with or to prevent them from seeing confidential data, you can hide data in a range so the range appears blank. You also can hide a column or entire worksheet; you cannot hide data in an entire row.

Even though hidden data is invisible, it doesn't affect formulas that depend upon the data. It's wise to protect and seal hidden data so it's not accidentally changed. Another important point to remember, especially with confidential data, is that when the cursor is in a hidden cell, its contents will display in the contents box unless you seal the file.

To hide data in a range, select the range to hide. Choose Style, Number Format, select Hidden, and click OK. The contents of the range are no longer visible and will not print.

When you hide a column, you are hiding the letter for that column along with the column contents. When you hide a worksheet, the tab for that worksheet will not appear. To hide a column or worksheet, select the entire column or worksheet and choose Style, Hide.

To display a hidden range, select the range and choose Style, Number Format, then Reset. To display a hidden column or worksheet, select a cell or range of cells in the columns or worksheets surrounding the one you want to display. For example, select some cells in columns N and P to display column O, or select cells in worksheets A and C to display worksheet B. Choose Style, Hide and select Column or Sheet. Choose Show to display the data. ■

by Diane Kaye Walkowiak, M.A.

Quicken Deluxe 6.0

Charting Your Financial Progress

- *Personal Finance*
- *Intermediate*
- *6.0 For Win*

IF YOU NEED A PICTURE of your financial situation, don't throw together an archaic table of mind-numbing figures. You need a method for comparing the numbers. One of *Quicken Deluxe 6.0's* most useful features is its ability to answer nearly any question about your financial situation visually, through charts and graphs.

Finances Graph(ically)

Charts and graphs are good methods of comparing information, such as income vs. expenses or savings achieved vs. a savings goal. Quicken offers preset charts and graphs that provide comparisons for common financial situations.

To use one of Quicken's preset graphs, click the Reports menu, the Graphs submenu, and then the command for the preset graph you want.

For this example, we chose the most common type of graph, Income And Expense. (It doesn't matter what type of graph you choose from the Graphs submenu's drop-down list because in the next window, Create Graph, you will again have to choose one of the five types of preset graphs.)

In the Create Graph window, click the type of graph you want to create. Choose the dates you want the graph to encompass. If you select a preset time length in the Graph Dates text box, Quicken will automatically adjust the dates in the From and To text boxes. For the most informative results, you should use data that encompasses as much time as possible. Then click the Create button.

For the Income And Expense graph, Quicken uses a bar chart to show your income amounts vs. your expenses. You'll also see a pie chart that shows you the distribution of your expenses. (For your charts to display the proper information, you must enter categories for all your transactions.)

To see exact amounts in each portion of the graph, hold your cursor over a portion of the graph. After a couple of seconds, a pop-up window will display the amount. To see additional information about the portion of the graph, double-click when your cursor becomes a magnifying glass with a Z. Quicken will open a QuickZoom Graph, showing you details of that area. Close the QuickZoom Graph to return to the Income And Expense Graph. You also can use the QuickZoom feature on amounts in the graph's key.

Investment Performance Graph
Monthly Portfolio Value 5/1/98 - 8/13/98
$ in thousands
Average Annual Total Return 5/1/98 - 8/13/98
$ in thousands

A graph created through the EasyAnswer Report command focuses on one aspect of your finances.

Customizing Charts

In addition to using the preset charts and graphs as they are, you can make a few subtle changes to yield the exact results you want.

Customize. When you click the Customize button in the Create Graph or Graph window, you can choose exactly what accounts and expense categories Quicken will use to calculate your graph. Remove the green check from an account or category to eliminate it from the graph.

You will probably want to choose particular accounts to help narrow your graph's contents and give you a clear picture of a certain aspect of your finances. Only use all accounts in your graph if you want to see an overview.

Memorize. When you create a customized graph, you can save a copy of your graph to reuse it in a later Quicken session. Once you set up the graph, click the Memorize button in the Graph window. Name the graph in the Name text box and click OK.

To find your memorized graphs later, click the Reports menu, the Graphs submenu, and then the Memorized Graphs command. In the Memorized Graphs window, highlight the graph you want and click the Use button.

Options. You can change the way your graph looks using the Graph window's Options button. You can choose to create the graph in black-and-white patterns instead of color or as a two-dimensional (2-D) graph instead of the default three-dimensional (3-D) graph.

Easy Answers

One final type of preset graph Quicken can create is an EasyAnswer Report. Click the Reports menu and the EasyAnswer Reports command. Click the common financial question you want answered. Then choose the dates to include in the graph. Finally, click the Show Graph button. (For some questions, the Show Graph button is unavailable.) This is probably the easiest method of creating a quick graph for one aspect of your financial picture. ■

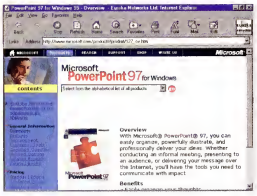
by Kyle Schurman

PowerPoint 97

Connect To The Web

- Presentations
- Intermediate
- 97 for Win95

ONE OF THE SLICKEST things about *PowerPoint 97* is its seamless integration with the World Wide Web. You can hop on the Web (or your organization's **intranet**, an internal network that works like the Internet) from within PowerPoint. After you're on the Web, you can quickly reach a wealth of data about PowerPoint. This month we'll show you how to use PowerPoint's built-in features to travel across the Web and between *Office* documents effectively.



***PowerPoint* provides seamless connections to large resources on the World Wide Web.**

Though PowerPoint's internal help system is handy, at times you've probably exhausted its resources without finding the information you really need. That's when you can turn to the Web, including the PowerPoint page. For example, you can display Web pages to find product news, download free stuff (such as new clip art), or work through an online tutorial. To jump onto the Web from within PowerPoint, open the Help menu and choose Microsoft On The Web (Help, Microsoft On The Web); then pick a topic from the submenu that appears. Complete whatever steps you normally do to connect to the Web (such as clicking a Connect button or entering your password), and PowerPoint will automatically display the appropriate Web page. While you're viewing the information, PowerPoint is still running on your Desktop so you can continue working as you're getting information online.

Using The Web Toolbar

If you plan on cruising around the Web, an intranet, or Office documents, you need an easy system. The Office 97 applications include the Web toolbar so you can easily browse, find, and open documents and Web pages.

The Web toolbar automatically appears when you use hyperlinks to browse Office documents. You also can display this toolbar by right-clicking a visible toolbar, then choosing Web from the shortcut menu. Alternately, click the Web Toolbar button (a globe with arrows) on PowerPoint's Standard Toolbar. To hide the toolbar, reverse either of these actions or choose View, Toolbars, Web. Also, if your PowerPoint screen is becoming cluttered with toolbars, you can clean it by clicking the Show Only Web Toolbar button on the Web Toolbar (a box with an arrow pointing up).

You'll probably notice a similarity between the Web toolbar's buttons and your Web browser's buttons. Microsoft hopes this similarity will help you instinctively figure out how the Web toolbar buttons work. For example, you can click the Back and Forward buttons to move back and forth between Office documents—just as you use the Back and Forward buttons on your Web browser to move between Web pages. But the Web toolbar also provides other ways to jump between documents and access the Web. You can click the Go button, then choose Open from the shortcut menu to display the Open Internet Address dialog box. Enter a Web address (or file location) and then click OK. You also can quickly find a Web page by entering a Web address (such as http:\\www.microsoft.com) or file location in the Address box and pressing ENTER.

PowerPoint Central

Another rich information source is PowerPoint Central, an on-screen magazine that includes articles and tips on creating stunning presentations. PowerPoint Central also includes hyperlinks to Web sites with resources such as snazzy clips—including videos, sounds, and photographs—for your presentations.

To launch PowerPoint Central, choose Tools, PowerPoint Central. If you don't have the latest version, PowerPoint will prompt you to download it from the Web. To obtain the latest version, choose Yes in the message box; choose No to display your current version. Next, the PowerPoint Central presentation will start. By clicking the hyperlinks (and buttons on the Web toolbar) you can navigate and explore features on either your Office CD-ROM or on the Web. For example, you can click the Free Stuff button, then click one hyperlink to connect to Microsoft's Web site; click another to access the ValuPack folder on your CD-ROM. When you finish finding information in PowerPoint Central, click the Close Window button to redisplay PowerPoint.

Now that you know how easy it is to get to the Web (and PowerPoint Central) from within PowerPoint, go for a spin until next month when you learn to install tools for creating Web-based presentations. ❚❚

by Linda Bird

Web Browsers

Customizing Internet Explorer 4.0 Toolbars

- Web Browsers
- Intermediate
- Explorer 4.0

THE WORLD WIDE WEB'S big selling point is the easy way users can navigate from one site to the next. One reason browser programs seem uncharacteristically easy to use is the toolbar, with its big, almost immediately recognizable buttons.

In *Microsoft Internet Explorer 4.0*, toolbars do more than just provide places to park buttons. You can customize these handy feature clearinghouses to fit the way you use the browser.

Different Look

First, try rearranging the toolbars. To drag a toolbar, place the mouse cursor over the left edge of a toolbar, where you see the raised vertical line marks. Click and hold down the mouse button and drag the toolbar up, down, or sideways. As you move a toolbar up or down, the other toolbars move around to provide an open spot. You even can drag a toolbar to the menu bar.

To get rid of toolbars you never use or regain toolbars you thought were lost forever, just right-click any toolbar or the menu bar. Up pops a list of available toolbars. Click any one of the three to flick it on or off. Notice that you also can turn on or off the text labels that appear on the Standard Buttons toolbar. Turning off the text can greatly reduce the amount of screen space your toolbars take up, and the icons are all you really need once you get the hang of using the browser anyway.

You don't have to turn a toolbar off to save on-screen real estate. Toolbars can be resized when they're sharing a line to take up the minimum amount of room but still be just a double-click away. Move the mouse to the edge of the toolbar as if you wanted to drag it up or down. Holding down the mouse button, move from side to side to resize the toolbar. Release the mouse button when the toolbar is the size you want. This trick comes in most handy for the Address Bar. You can move it to the same level as the Menu bar, then resize it so both toolbars share space. That way you easily can access either one without wasting a whole toolbar line.

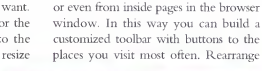
If you resize the Menu or Links toolbars so they are too small to display all of their contents, tiny arrows appear at either end. Click these arrows to scroll through the commands on either side. Double-click a minimized toolbar to quickly see it in its entirety. The toolbar will expand to fill the entire row. Double-click again to minimize it.

Microsoft Office users are used to toolbars with smaller buttons than those Internet Explorer sports. Trim those big buttons down to size with an option in the Advanced menu. Under the View menu, choose Internet Options. Click the Advanced tab to pull up an area where users can change a variety of minor Explorer options. Scroll down to the Toolbar area and place a check in the box labeled Small Icons. This setting causes smaller buttons to replace the familiar large buttons in all toolbars. Click OK to return to the main window.

While you're in the Advanced tab, you might notice one other toolbar option labeled Show Font Button. This check box turns on and off the toolbar's Font button, which lets you quickly change the size of the words displayed in the browser window. This button is useful if you ever run across a page with tiny, unreadable type or humongous type that takes up too much space.

Quick Links

Internet Explorer's Links toolbar gives users the most opportunity to create their environment. You can drag shortcuts to favorite sites to the Links bar from the Address Bar, Favorites menu, or even from inside pages in the browser window. In this way you can build a customized toolbar with buttons to the places you visit most often. Rearrange items on the Links bar by dragging them to new locations within the bar.



***Microsoft Internet Explorer 4.0* features toolbars that can be customized to fit the way you use the browser. Notice this Address Bar is tucked up with the Menu Bar.**

Shortcuts on the Links toolbar actually are stored in a special LINKS folder on the Favorites menu. Since the Links toolbar space is valuable, you may want to rename links with one-word titles by choosing Organize Favorites in the Favorites menu, browsing to the LINKS folder, and using the Rename button.

Oddly enough, the Links bar is the only toolbar that lets users add or remove buttons. While you can alter Explorer 4.0 to an extent, it does not approach the customization capabilities of programs such as Microsoft Office. The limitation might fit in with the "keep it simple" motto for browsers, but a little more flexibility would be nice for more experienced users. ■

by Alan Phelps

HTML

Create A Visitor Feedback Form

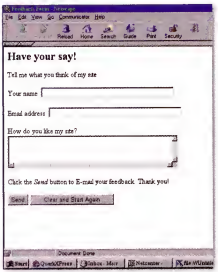
- *Online*
- *Intermediate*

It's fun to hear that someone liked visiting your World Wide Web site. A smart way to encourage this contact is to provide a form visitors can complete and send via E-mail by pressing a button. This month's project is a simple feedback form created in pure HTML. When visitors complete the form they press the Send button and their browsers send E-mail messages with the data to you. Most major browsers, except *Microsoft Internet Explorer 3.0*, support forms.

Creating The Form

To create the page simply type the following code into a new document and save it as a text file with the .HTM file extension. (*NOTE: Make sure you use your E-mail address instead of the "mailto:yourID @your server.com".*)

```
<HTML>
<HEAD><TITLE>Feedback Form</TITLE>
</HEAD>
<BODY>
<H2>Have your say!</H2></FONT>
Tell me what you think of my site.<P>
<FORM METHOD=POST ENCTYPE="text/plain" ACTION="mailto:yourID@your-server.com">
Your name: <INPUT NAME="Visitor" TYPE="text" SIZE="35"><P>
Email address: <INPUT NAME="Email" TYPE="text" SIZE="35"><P>
How do you like my site? <BR>
<TEXTAREA NAME="Improvements" ROWS=3 COLS=45></TEXTAREA><P>
Click the <i>Send</i> button to E-mail your feedback. Thank you!<P>
<INPUT TYPE="submit" VALUE="Send">
<INPUT TYPE="reset" VALUE="Clear and Start Again"><P>
</FORM>
</BODY>
</HTML>
```


Have your say!
Tell me what you think of my site
Your name
Email address
How do you like my site?
Click the Send button to E-mail your feedback. Thank you!
Send
Clear and Start Again

This feedback form lets visitors tell you what they think of your World Wide Web site. The data from the form will be sent to you in an E-mail message.

How It Works

You create the form within <FORM>...</FORM> tags. We give the METHOD attribute the POST value because this is an E-mail form, and the attribute ENCTYPE describes the sent data as unformatted text. The ACTION attribute contains the E-mail address data will be sent to.

The INPUT tag creates many of the controls, such as input fields and radio buttons, that get information from your visitor. We create each control by giving the TYPE attribute a value that identifies the required control.

The TYPE="text" attribute creates an input field or box for your visitor to type a line of text. This form uses input fields for the visitor's name and E-mail address. The SIZE attribute specifies the length of the "box" on-screen, measured in characters. This doesn't limit the amount of text your visitor can type, as text scrolls inside the box.

Each input field has a different value for its NAME attribute and this appears opposite the data in the E-mail message.

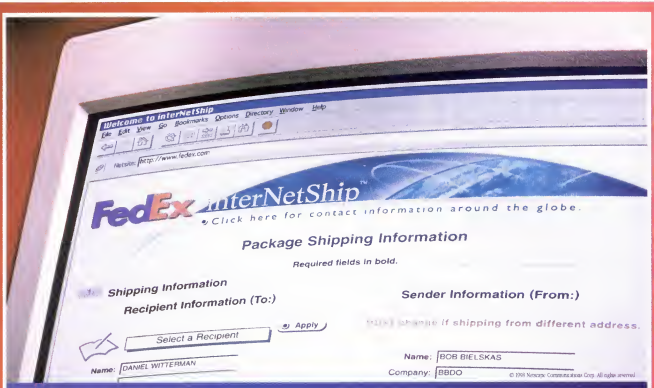
TYPE="submit" creates a "submit" button for your visitor to send an E-mail message with the form data. The VALUE= "Send" attribute provides the text on the button face. TYPE= "reset" creates a reset button to reset or clear the form, and the text on the button face is created by its VALUE attribute.

Finally, the TEXTAREA tag creates the large box on the form. This is a text area and lets your visitors type multiple lines of text—something they cannot do in an input field. The NAME attribute is the identifying text you see in the E-mail message.

The ROWS and COLS attributes specify the height and width of the text area, in number of characters and lines. Like the input field, this only limits the size of the box on the screen and not the amount of text that your visitors can type.

The code here gives you a simple feedback form you can use as is or adapt for your needs. Perhaps you might add a background color to the page, an image, or add other controls to get more information from your visitors. The choice is yours! ▮

by Helen Bradley



Ship all your packages without lifting a finger.

{OK, maybe one.}

Shipping is as easy as Point. Click. interNetShip.™ At fedex.com. Simply do all your shipping online. Imagine, no more filling out airbills by hand. No more time wasted looking for addresses. Just go to FedEx interNetShip, click on the recipient's name and the built-in address book fills out the rest. Then, print the airbills right from your own computer. Who would've thought one finger could wield so much power?

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Microsoft Excel 97

Using SUMIF & COUNTIF

- Spreadsheets
- Advanced
- 97 For Win95

YOUR BOSS WANTS to know how many company employees make more than $20,000, as well as the combined total of their salaries...and he wants it in five minutes. You have an *Excel* worksheet listing the employees, but you don't want to use time-consuming database functions such as DSUM and DCOUNT to get the data. What do you do?

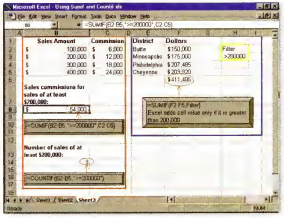
Excel comes to the rescue with some quick and slick alternatives: COUNTIF and SUMIF. COUNTIF finds the *number* of cells in a range that conform to your criteria, while SUMIF *adds* only the cells with values that match the criteria. So if you're specifying a single condition, these functions are handy to use in place of DSUM and DCOUNT.

For example, imagine you have a listing of real estate properties and need to know how many houses have four bedrooms and the houses' combined value. You can use COUNTIF to find the number of four-bedroom houses, then use SUMIF to find their total value. Or perhaps you want to know the number of your accounts that are more than 30 days old and the total amount they represent. You use COUNTIF to find the number of accounts, and SUMIF to find the combined dollar amount. Let's take a quick run-through of these handy (and time-saving) functions.

Using COUNTIF

You can use COUNTIF to find the number of cells with values that meet specified criteria, such as the number of customers with a credit limit of more than $50,000. The basic syntax for the function is **=COUNTIF (Range, Criteria)**.

Range refers to the cells to calculate, while **Criteria** specifies the number, text, or expression you want to use to evaluate the range. It can be an exact match ("part number 52") or a range of numbers (">100"). To indicate a range of values you can use comparison operators such as > and <>. Also, be sure to enclose the criteria in quotes.



Microsoft Excel 97's **SUMIF function pulls out and totals data .**

The sample worksheet on this page shows how to set up this function. For example, imagine you want to know the number of sales that were equal to or greater than $200,000. Since the range you want to examine is B2:B5, the formula in B14 is =COUNTIF (B2:B5,">=200000").

Using SUMIF

SUMIF totals up all cells that conform to a certain criteria. The syntax for this function is **=SUMIF(check_range,criteria,sum_range)**.

The **check range** specifies the cells you want to evaluate. You can indicate the check range using cell addresses or a range name. The next argument, criteria, specifies the condition to test the check range for. You indicate the criteria for SUMIF as an exact match or by using a comparison operator to specify a range. If you want, you also can place the criteria in a separate cell and then assign a range name to that cell.

The last argument, **sum range**, is optional. You can use it to indicate which cells Excel should total. Excel finds the cells in the sum range that correspond to the check range and then totals them. For example, if you have sales representatives' names in cells A1:A4 and their corresponding sales amounts in cells B1:B4 you can use it to find the total sales for "Jones." To do this, you use the formula **=SUMIF(A1:A4,"Jones", B1:B4)**. The cells in sum range are totaled only if their corresponding cells in the check range match the criteria. Remember that the sum range is optional; if it isn't used, Excel totals the cells in check range instead.

Let's look at some more examples of SUMIF in action. In the sample worksheet, sale amounts are in cells B2:B5. The corresponding commissions are in cells C2:C5. To sum up the commissions for $200,000 (and above) sales, you can use the formula **=SUMIF (B2:B5,">=200000",C2:C5)**.

For another example look at the right side of the sample worksheet. The criteria (">200000") is in cell H3, with a range name of Filter. Your formula, =SUMIF(F2:F5,Filter), is in cell F6. Because there is no sum range specified, Excel sums the check range instead.

There you have it! With SUMIF and COUNTIF at your fingertips you'll be able to analyze and calculate data—but only the data you really want. ■

by Linda Bird

Print Shop Premier

Online Greetings

- *Desktop Publishing*
- *Advanced*
- *Premier For Win95*

WITH *PRINT SHOP Premier Edition* you can send Online Greetings over the Internet.

Start by choosing Online Greetings from Print Shop's Select A Project main menu. Click Help Me Design to take advantage of Print Shop's artwork and design layout suggestions, then click the Next button. Click the box at the left of the No Backdrop option to enter a check mark. (If you work with a blank backdrop, you minimize visual distractions and make your message more readable.) Click Next.

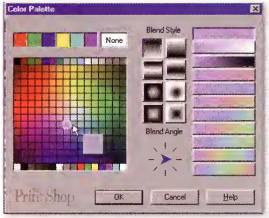
Scroll through the list of layouts on the Select A Layout screen. Print Shop offers six ready-made Online Greetings designs from which to choose. You can preview any one of them in the window on the right side of the screen. Simply click a layout once to see a thumbnail preview. Click OK if you like what you see. If not, preview another selection. You can double-click a selection or click OK to have a particular layout open on the Design Desk as an Untitled Online Greeting.

Bordering On Great!

Borders provide a quick, easy way to dress up and frame an Online Greeting. To insert a full panel border, click the Border/Line button on the Object toolbar, then click Border. Alternatively, choose the Insert menu and Border/Line, Border (Insert, Border/Line, Border).

Print Shop's Select A Border dialog box appears, offering an assortment of borders by category. Choose a category, then preview Print Shop offerings in the window on the right. The default Gallery View displays four borders at a time. Select a border in the Preview window, then click OK. Print Shop returns you to the Design Desk, applying your border selection to the Online Greetings project.

You may have to reposition some text and graphics elements on the Greetings panel to prevent them from being masked by the border. To move an object to a new location, drag it to the desired spot. To resize an object, click once on the object to select it, then drag a corner handle. To add color to a black-and-white border, right-click the border; choose Color, Behind Object from the pop-up menu; select a color from the Color Palette dialog box; then click OK.



***Print Shop's* Color Palette lets you spice up an Online Greetings project by adding a color of your choosing to the document's border.**

To edit text in a text placeholder box, double-click the text box. Once the I-beam cursor appears, you can delete existing text, type in new text, or format selected text using buttons on the Text toolbar. Alternatively, choose Text, Text Settings to make font, type style, type size, and text color changes.

To add a custom or mini-border around an Online Greetings text or graphics object, click the Border/Line button on the Object toolbar, then choose Mini-border from the pop-up menu. Double-click a mini-border style from the Select A Mini-Border categories window to place the mini-border on the Design Desk. This graphic element appears in the center of the project window. Drag it to the appropriate location in the project, then resize it so it encloses the text or graphics object you want to frame.

To replace a graphics placeholder with a more appropriate image, right-click the placeholder, then choose Replace Graphic from the pop-up menu. Print Shop's Select A Graphic dialog box appears. To search for a graphic by keyword, click the Keywords tab, then enter your search word. Click the Start Search button. Print Shop shows its matches as thumbnails in the Preview window on the right side of the Select A Graphic dialog box. Double-click the graphic you want to insert. Duplicate any panel graphic by clicking the graphic to select it, then choosing Edit, Duplicate. Choose File, Save to name and save your project.

No Stamps Required

When you finish the project, choose File, Send. Enter the names and E-mail addresses of recipients in the To box of the Prepare Your Message dialog box, then click Add. Enter information in the Subject and Message boxes as necessary. Click the Configure button to ensure the program has a record of your E-mail address and name. Click Send to connect to your Internet service provider. Print Shop sends your greetings as a JPEG attachment to an E-mail message, notifying you when it's sent. ■

by Carol S. Holzberg, Ph.D.

Microsoft Works 4.0

Creating Invoices

Spreadsheets
Advanced
4.0 For Win95

IF YOU WANT your business to run smoothly, it is important to have a good invoicing system. *Microsoft Works 4.0* makes it easy to create the perfect invoice. Works lets you create a system that is complete, accurate, and organized in a few simple steps.

(*NOTE: We are assuming that you're familiar with the spreadsheet tool, including adding and multiplying values.*)

You can create three invoice types with the Invoice TaskWizard: the Long Invoice, the Dual Invoice, and the Combo Form.

Get Started

It's often easier to modify a TaskWizard than create a new document. You must first, however, run the Protection command from the Format menu. In the Format Protection window, unselect the Protect Data box and then click OK. Then you can add and delete column and rows without disrupting the formulas.

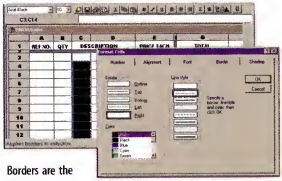
Remember, however, that an invoice should have room for customer information, a description of the product or service, price, and payment information.

Invoice Formatting

Once the text is complete, it's time to concentrate on appearances. We don't recommend using AutoFormat because it can dramatically alter column widths and usually adds unnecessary distractions. Adjust the font, size, and alignment of text by selecting a block of cells, right-clicking, and selecting Format.

Only when you have entered all the outline text (not the data) and formatted should you start adjusting column widths and row heights. Enter sample data to get an idea of how large cells should be. Then, drag the mouse along the numbers or letters of the rows or columns until the Adjust icon (two arrows pointing in opposite directions) appears, and move it as desired. To see how the invoice fits on the printed page, use Print Preview under the File menu.

Next, adjust the look of the boxes on the invoice using the Border and Shading commands under the Format menu. Use the Borders command to add horizontal blank lines where you will fill in information by selecting the cells and then only the bottom border in the Borders menu. Remember that every cell on the spreadsheet does not need a purpose, but every box does. One box can encompass several cells; the information from one cell spills into bordering empty cells. To make one box bigger, delete the border between cells. Also, to add thick accent lines, insert narrow rows or columns, then add shading.



Borders are the key to designing a professional-looking invoice. You can create one box from multiple cells by manipulating the border on each side of a cell.

More Functions

Works uses the Wingdings font to add a graphical element to invoices. To insert any artwork, however, you will have to embed the invoice into a word processing document. Works' word processing tool has a special command for this under the Insert menu: Spreadsheet.

Unfortunately, the only way to insert database information seems to be copying and pasting individual, named fields, and there is no way to have invoices automatically, sequentially numbered.

If you want one document to contain more than one invoice—as on the Dual Invoice form—copy your invoice to your word processing document last. Note, however, that Works will not change the column heights or row widths; you must do it manually, checking and changing the Row Height and Column Width options under the Format menu.

Finishing Up

Before you go any further, carefully look over your work. Check the formulas. Print a copy. Then, select any block of cells you do not want changed, such as titles, and choose Protection under the Format menu. Place a check by Protect Data and Locked by clicking them and then click the OK button. (Sometimes you will notice that the Locked box is gray. This is because of the way the Locked and Protect Data functions interrelate. Click until the check is black on white.) This will protect the data and allow the TAB key to jump the cursor from one unlocked cell to the next, making data entry easy.

Finally, select Save As under the File menu. Click the Template button, type a name, and click the OK button. Your invoice now appears in the TaskWizard, just like the others. Open it up and bill away. ❚❚

by Sarah D. Scalet

Don't you have more important things to do than wait on line at the Post Office?

You need a Personal Post Office™

In a business world where time is money and image is everything, the new Personal Post Office™ gives you everything you need. You'll never go out for stamps again because postage refills by phone in under 30 seconds with total security. And you'll never use too much postage again because the electronic scale eliminates wasted postage. You can even add your own promotional message to ensure your customers and prospects open *your* mail immediately. And despite its big features, the new Personal Post Office™ fits on a corner of your desk!

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* Pitney Bowes Personal Post Office™
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1. Weigh envelope on electronic scale for exact postage

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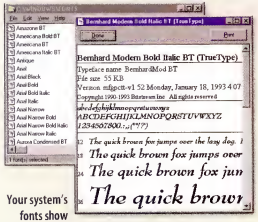
Quick Tips

Secrets To Succeeding In Common Tasks

Fonts

✓ Choosing the right font based on ambiguous names listed in a dialog box is usually a guessing game. Simplify your choice by previewing the look of your PC's fonts with Windows 95, 98, or NT. Click the Start button, Settings, and then Control Panel. Click the Fonts icon; then click the name of any font you wish to preview. A window will appear showing you font copyright information, the font's style, how the font looks in different modes such as italic or bold, and the font at different point sizes.

The Fonts icon also helps you find similar fonts. Open the View menu and select List Fonts By Similarity. Then select a font from the pull-down menu ("List fonts by similarity to:"), and the fonts will be ranked below as Very Similar, Fairly Similar, or Not Similar. To narrow down the list of options, select Hide Variations under the View menu to hide italic and bold versions of fonts.


Bernhard Modern Bold Italic BT (TrueType)
Bernhard Modern Bold Italic BT (TrueType)
Typeface name: BernhardMod BT
File size: 55 KB
Version: mfgtcrt-v1.52 Monday, January 18, 1993 4:07
Copyright 1990-1993 Bitstream Inc. All rights reserved
The quick brown fox jumps over the lazy dog. 1
The quick brown fox jumps over
The quick brown fox jum
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Your system's fonts show themselves in the Fonts Control Panel.

Web Browsers

✓ Many World Wide Web users don't realize they have a choice of **home pages**, the first page that opens in your browser. You can add a little variety by changing it. You'll need the Web address (or **universal resource locator**, **URL**) for the page you'd like to automatically appear in your browser.

In *Netscape Communicator*, open the Edit menu and choose Preferences. The Home Page section of the dialog box lists the URL for your current home page. Enter a new URL to establish a new home page and click OK.

In *Internet Explorer 3.0* open the View menu and select Options. Select the Navigation tab, and you'll see fields for Start Page, Name, and Address. Enter the URL of the new start page in Address and click OK. In Explorer 4.0 open the View menu and choose Internet Options. Select the General tab. In the Home Page field enter the URL for your new home page and click OK.

✓ If your list of browser favorites (or bookmarks) has grown unwieldy, clean out those rarely used choices. If you've added these addresses in *Microsoft Internet Explorer* with your Add To Favorites function, simply open the Favorites menu and choose Organize Favorites. All your files will appear, and you can delete those you no longer need by selecting the address and pressing DELETE. Multiple files may be selected for deletion by holding down the CTRL key as you click each file.

In *Netscape Communicator*, your marked sites are referred to as Bookmarks. The interface features a button for Bookmarks. To delete a bookmark, simply select Edit Bookmarks from the Bookmarks pop-up menu to see a complete list of current bookmarks. Click the file you wish to delete, then right-click to bring up a menu that includes Delete Bookmark. You also can select the bookmark and press the DELETE key.

Monitors

✓ If your work with graphics demands crisp, clear, high-resolution images (such as 1,600 by 1,440) get a big-screen monitor. High resolutions produce large numbers of **pixels** (the tiny dots that make up images). Squeezing all those dots onto a 13-, 15-, or even 17-inch monitor produces tiny icons, graphics, and text. Larger screens offer workable image sizes along with the high resolutions.

Microsoft Word

✓ Sometimes it's handier to move sentences with a mouse-click than the Cut and Paste options. To use the Drag and Drop function in the latest versions of *Microsoft Word*, highlight the area of the paragraph you wish to move, then click and hold the right mouse button to see a pointer. While holding down the button move the pointer where you want the information inserted, then let go. To prevent accidental movement of text, disable the Drag and Drop function. Open the Tools menu, choose Options, and click the Edit tab. To disable Drag and Drop text editing, make sure there is no check in the box beside that option.

World Wide Web

✓ When trying to find someone's contact information, try finding his or her E-mail address, residential address, or telephone number using Web search services dedicated to this task. Try Bigfoot (http://www.bigfoot.com), WhoWhere (http://www.whowhere.com), or Four11 (http://www.four11.com). These sites offer basic and advanced searches by E-mail address,

name, or telephone number.

Windows 95/98

✓ Maximize your visible Desktop space by hiding the Taskbar in Windows 95 or Windows 98. To do so, right-click the Taskbar, then click Properties. In the Taskbar Properties dialog box, click the box next to Auto Hide, then click OK. Now your Taskbar will disappear, showing itself only when you point to the bottom of your screen. Another way to the Taskbar Properties box is to click Start, point to Settings, then Taskbar & Start Menu.

Mice

✓ Your mouse has more than one button for a reason. The seldom-used right button provides access to many features in Windows versions since Windows 95. For example, when you right-click a Desktop icon, a pop-up menu appears, offering several options. You can open the program associated with the icon, open the Windows Explorer window and view the folder for the program associated with the icon, and check out that program's properties.

Microsoft Office

✓ The Office Shortcut Bar in *Microsoft Office 97* offers one-click access to Office programs. But you also can use the Shortcut Bar to access non-Office 97 programs. Click the Office icon at the end of the Shortcut bar and click Customize. Click the Buttons tab, then the Add File button. Browse through your folders and files until you find the file or application you want to add to the toolbar. Click the file to highlight it, then click the Add button to place the file on your toolbar.

Too loud? Too quiet? It's not too hard to make adjustments when you double-click Windows 95/98's speaker icon.

Audio

✓ In Windows 95 or 98, you can click the volume button in the System Tray (in the screen's bottom-right corner) to change your PC's sound volume. Single-clicking lets you change the master volume, covering everything from system sounds to music from your CD player. Double-clicking opens the Volume Control panel, which acts like a sound mixer. You can adjust the main volume plus the volume of certain types of sounds such as Wave sounds, MIDI sounds, CD Music, or sound coming from the Line-In jack on the sound card.

Windows Fixes

✓ Whether you're looking for the latest patch for Windows 95 or a new Desktop theme, WinFiles.com (http://www.winfiles.com) is the site for you. This resource originally was called Windows95.com, but the site's developers received so many requests for a site that dealt with all versions of Windows, they decided to make one. As a result, WinFiles.com includes shareware and updates for Win95, Windows 98, Windows NT, and even Windows CE. WinFiles.com sells CD-ROM collections of its shareware, and users can sign up to have free E-mail updates sent to them when new items are added to the site.

Portable PCs

✓ Professionals who depend on a handheld PC or palm PC to keep their lives organized probably know the frustration of new or recharged batteries running out of juice earlier than expected. If you're having battery problems it's probably because you're using the device's backlight too much. While it's a handy feature, the backlight can quickly rob a fresh battery of power. Change the backlight setting so it comes on only when you specifically turn it on and make sure it turns itself off when you're not using it.

Ergonomics

✓ Just because you have a fancy, gel-filled, internally heated pad in front of your keyboard doesn't mean you should rest your wrists on it all the time. To the contrary, experts suggest you use your wrist rest only during the pauses between stretches of typing. The correct ergonomic typing position is wrists straight, hovering just over the rest. Leaving your wrists on the rest can force you to bend your wrist into an unnatural position, causing fatigue and possibly injury.

Audio CDs

✓ Here's an easy way to select your favorite song when you use Windows 95's CD Player. Rather than clicking the Advance button over and over to move through tracks in order, click the down arrow for the Track drop-down list box. Select the number or title of the track you wish to hear. The track will be selected for your listening pleasure. You also can choose which songs you want to hear by clicking the Edit Play List icon (it looks like a piece of paper and pencil) and adding or removing tracks. If you don't see icons at the top of the CD Player, open the View menu and select Toolbar. The icons will appear near the top of the CD Player. ■

Should My PC Have DVD?

This New Disc Is Hot, But It's No Must-Have Upgrade

Jason Cobb

MANY HOME COMPUTER USERS seem to be waiting for the green light on DVD—and for good reason. Industry hoopla touts DVD as the next big thing, but it has yet to prove itself as a necessity for the average user.

Unless you have money to burn, there are few reasons to pay for DVD technology, says Mark Hardie, a senior analyst with Forrester Research Inc. "It's going to cost you a lot of money," he says, "and there's not a whole lot you can do with it except watch a very small number of titles that are available."

Digital Video Disc (DVD) is visually similar to the ubiquitous CD-ROM, but the difference lies in its storage capabilities. DVDs can store up to 17 billion bytes, depending on the disc. Even the very minimum 4.7 gigabytes (GB) of data that most single-sided DVD-ROMs can hold is a great deal more than the 650 megabytes (MB) that fit on CD-ROMs. DVD also provides superior picture quality to that of its sister CDs and incorporates the new compression standard, Motion Picture Experts Group (MPEG) 2.

The "Video" in DVD stands for its ability to hold video data, but the technology is not solely limited to moving picture content. It can store immense amounts of all types of digital data including multimedia elements, but also data in the basic form of text. Despite this versatility, DVD is still primarily a medium for movies. Hundreds of films are on DVD, but only a handful of software titles.

DVD-Video

Often referred to simply as DVD, **DVD-Video** is the film component of disc production. Video DVDs are purely for pleasure. You play them on a DVD player hooked up to the television in much the same manner as a VCR. DVDs let film companies add multiple camera angles and additional footage with ease. With multiple language tracks, parental control of content, and other items of interactivity, viewers also benefit.

Movie fans can walk into most any Blockbuster Video and rent the latest Hollywood hits in DVD format for the same price as a VHS tape. Many retailers sell copies too, with DVD-Video discs costing an average price of $24.95. Discount retailers are likely to sell discs for even less.

From a consumer electronics standpoint, however, DVD players are not ready for prime time. One reason for this is players are currently capable of playback only; interested consumers still need a VCR for home recording.

DVD-ROM

Due to the cost and limited use, Hardie isn't enthused about DVD's place in the PC market either. "From a PC standpoint, if you're a new user, if you're looking at low-cost PC solutions, you're not going to find DVD in the sub-$1,500 machines," he says.

DVD-ROM holds computer software and is played solely on the PC's corresponding drive. Folks who've amassed quite a collection of CD-ROMs need not fear their dollars have gone to waste. Most DVD-ROM drives are backward-compatible, which means they will read CD-ROMs, although early generations will play much slower than most new CD-ROM drives.

Just as you can play the latest Aerosmith CD in your CD-ROM drive, so can you play most DVD-Videos in your computer's DVD-ROM drive. Systems that use less than a 266 megahertz Pentium II processor, however, must first have additional hardware to decode MPEG-2 video and Dolby/Digital/MPEG-2/PCM audio. Some drives may come with decoding capabilities, but for those that do not, upgrade kits are available.

But for what? With less than 20 DVD-ROM software titles available from such online retailers as DVD EXPRESS (http://www.dvdexpress.com) and DVD City (http://www.dvdcity.com), DVD-ROM doesn't yet have the industry support it needs to make home users rush out to buy one. Hardie says support will continue to grow, but in the meantime price-sensitive consumers are better served elsewhere. "It's coming along; it's not dead; it's not something I would say 'never go for,' but you have to be very sensible about how DVD fits into your computing purchase," he says. "For the vast majority, you're in as good a shape accepting that you'll get a fast CD-ROM." And, Hardie says, there's a bulk of content out there in the CD-ROM format, something still far off in DVD format.

More DVD

DVD technology's evolution is following nearly the same path as CD technology. Hot on the heels of plain old DVD is DVD-R, a recordable format. It is not rewritable, however, so mistakes are permanent. DVD-R is appealing because of its capacity, but the prohibitive cost makes it an unlikely contender for home users.

Another option looming on the horizon is a rewritable disc called DVD-RAM, the industry standard for digital recording and rewriting. Several manufacturers are developing this technology in different ways, each with its own name: DVD+RW from Hewlett Packard, Sony, and Phillips and DVD-R/W from Pioneer. Rewritable drives should be available later this year.

Doling Out Dollars

By year's end most new computer systems costing more than $1,500 will probably come with a DVD-ROM drive. Despite this, a DVD-ROM should not be the deciding factor when it comes to choosing a machine, Hardie says. "I just don't see the software out there or for that matter the compelling reason behind DVD as a make-or-break decision," he says.

At this stage in the development of DVD technology, DVD is little more than a cool way to view movies. But most home users aren't that interested in viewing movies on their desktop PCs, and even if they were, few of us have recliners in front of the monitor. The truth is there is not much these little discs can do yet and their cost is still too high for the majority of consumers. ■

by Anne Steyer Phelps

Charting The Disc Family Tree

(Prices are approximates based on online retailers.)

Disc type	Function	Capacity	Average price for drive/media	Other tidbits
CD-ROM	Read-only	650MB	$75 to $100/media varies(32x)	Currently the standard for home users.
CD-R	Read and record data	550MB and 650MB	$300 to $600/$2	Record the data correctly the first time—mistakes cannot be erased or changed.
CD-RW	Read, record, and rewrite	650MB	$350 to $600/$20 to $25	It's more expensive than CD-R and less backwards compatible, but it allows you to correct recording mistakes.
DVD-ROM	General purpose storage device; extension of the CD-ROM	4.7GB to 17GB	$189 to $199/ $20 and up (Upgrade kits $300 to $400)	More than seven times the storage capacity of a CD-ROM; able to read CD-ROMs.
DVD-R	Write-once optical disc for one-time recording and storage	3.2GB to 7.8GB	$17,000/$50 to $70	Once recorded, the DVD-R cannot be erased.
DVD-RAM	Reading, writing, and erasing	2.6GB (per side)	$500 to $800/$25 to $40	Rewritable standard.
DVD+RW	Competition for the DVD-RAM that records and rewrites	3.0GB	Coming soon	Will read DVD-ROMs and CDs, but isn't likely to be compatible with DVD-RAM.
DVD-R/W	Pioneer's DVD format for recording and rewriting	3.95GB	Coming soon	Will read DVD-ROMs and CDs, but isn't likely to be compatible with DVD-RAM.
DVD-Video	Interactive playback of high-quality video, specifically films and games	Up to four feature-length films.	$300 to 800/ Typically $11.95 and up	Played on a DVD player connected to a television.

Back Up To A Second Hard Drive

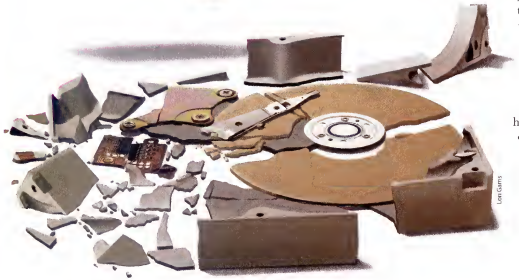
Dual-Drive Setups Make Protecting Data Convenient

WITH THE PRICE of hard drives down to three cents per megabyte and installation getting easier, it's tempting to buy a new drive—and equally tempting to keep the old drive in service as a second drive. If you're among the wise who realize the importance of backups, perhaps you're thinking of using that second drive as a backup device instead of tape, Zip, or Jaz drives.

We provided detailed instructions for installing a new hard drive and connecting two drives in a PC at once in our March 1998 issue's Upgrading section. You can find the story on our Web site at http://www.smartcomputing.com. We strongly suggest you read the older article before this one because this article assumes you already understand the significant tips and traps we covered in those articles.

There are some marked advantages to using a second hard drive for backup:

- The data you're backing up is more readily available. You can access programs and data from Windows without having to first run any special backup and restore software. The second hard drive will appear in directory windows (such as Windows Explorer or My Computer) as a regular drive with a letter such as D:.
- Between full backups, you can easily access the second drive, using normal save commands in whatever program you're working in to quickly save duplicate copies of critical files you're working on.
- Backup is much faster. Data transfers between two hard drives in the real world (as opposed to drive makers' stats) at rates of anywhere from 35 to 150 megabytes (MB) per minute. Most traditional desktop backup devices that are in a price range affordable for most individual users run about 5MB to 25MB per minute.
- If you experience a total hard drive wipeout and keep your backup data on normal removable media, it will typically take an hour or two to restore everything from backup—if it goes smoothly. If your hard drive actually failed mechanically, you'd still be out of business until it was replaced or repaired. On the other hand, if you have a second drive running with your complete programs and data on it, and manage the details correctly, you could be up and running on the spare drive in minutes.
- If you use normal backup media and your hard drive fails, the software you need for reading from your tape, Zip, or Jaz drive is often wiped out with your data. This makes a tedious job of getting your software and data back.



Liam Gaines

But using two drives also has disadvantages:

- Using a second hard drive, which is normally non-removable, instead of removable media as a backup device leaves you very vulnerable to disasters you think will never happen. If your computer is stolen or

destroyed by fire, flood, or other calamity, your backup's gone too.

- Windows has no simple provisions for duplicating/copying one hard drive onto another. You'll either have to learn some manual methods (which we'll cover here) or buy a special utility program (*DriveCopy*, *Ghost*, etc.) for the task.
- You may not need to make your second drive **bootable** (containing the files needed to start up the PC), but if you do, you should know that Windows provides no explanation of how to make a second drive bootable. (We provide most of the tools, below.)

Duplicating The Data

Our manual method of duplicating (backing up) the first hard drive (let's call it C:) to the second hard drive (let's call it D:) relies on a couple of batch files.

It's all done with commands at a DOS prompt in Windows 95/98 (Win95/98). (The XCOPY commands below work *only* from inside a DOS session under Win95/98, not after exiting Win95/98 to DOS.) Although we could give you each of the commands to manually execute at a DOS prompt, we've instead written two batch files that will execute all the commands for you. The files are too lengthy to include here, but you can find their complete text on our Web site. Just open the November 1998 issue and select this article from the table of contents. (If you don't have Web access, read on for descriptions of commercial software you can purchase to perform these tasks.)

To create the batch files you'll need to open Notepad, type each of the lines, then save the file with the appropriate name, such as Back-c2d.bat. We suggest you save it in the WINDOWS folder or some other location you won't forget. Then you can make a shortcut to that batch file to run it later. Of course if the two drives you want to copy between are not C: and D: you'll have to change the letters used in the batch files. The Backc2d file backs up the entire contents of one drive to the other. It's best to run the Backc2d batch file at least once a week (and just before making any major system adjustments) to ensure you have a current backup. The Bkupdate batch file only copies over data that is new or changed since the last true full backup of drive C:. This is very useful because it means that even if you've been working on two dozen projects and installed several new drivers and utilities, this "update" type routine can completely update your second drive's copy in perhaps a few minutes. Bkupdate runs quickly enough that you can run it at the end of each computing session or even periodically throughout the day.

Your backup can be even more versatile if the second hard drive is made removable by installing it in a pull-out drive carrier.

If this batch file stuff is too tedious or complex for you, you can more easily accomplish the same thing using a commercial disk cloning utility. Consider Ghost personal edition (Innovative Software, 800/817-5119, 414/964-2200, $50, free 30-day version at http://www.ghost soft.com) or DriveCopy ($30) or *DriveImage* ($70, PowerQuest, 800/379-2566, 801/437-8900, http://www.powerquest.com).

Mirrors & Illusions

You can buy drive controllers that **mirror** you first drive to your second drive. Mirroring means instantaneously copying every single change on your first drive to the second.

This seems like the ultimate built-in backup. If either disk fails the other has an up-to-the-second backup and can instantly take over. This is great if you're running a system (say airline reservations or a point-of-sale machine) you simply can't afford to have down for the hours it'd take to replace a hard drive and restore from tape backup. If your hard drive fails so badly that it's truly unreadable, a mirrored disk is excellent.

But the security of mirrored disks is sometimes an illusion; they emphatically aren't a substitute for a backup. There ability to instantly copy changes is also their weakness. A mirror disk doesn't understand that a file in your accounting system that's intact computer-wise is full of garbage accounting-wise. It faithfully, instantly, and stupidly copies the corrupt file onto the second hard drive. If you delete a file by mistake, it's deleted on the mirror. If a virus wrecks data on your primary hard drive, the mirror system happily spawns viruses and virus damage onto your secondary drive. And, of course, if your computer is stolen or destroyed you can kiss your data goodbye. The irony is that occasionally the illusion of complete security via mirrored disks sometimes keeps users from keeping adequate real (external) backups.

Take It With You

Although you can be justly smug about the convenience of backing up to a second hard drive, you can be even more versatile if that second drive—maybe even the first drive—is made removable by installing it in a removable pull-out drive carrier. In such a setup, you install a drawer-type carrier in one of your PC's drive bays. The cables that normally connect to a hard drive are connected to the back of this drawer, and a regular hard drive slides in and out of this drawer.

A removable second drive lets the more paranoid among us lock up the hard drive in a secure location or take it along when we leave town, comforted by the fact that if our house and family are destroyed in an earthquake at least we'll have our backup data. This setup also lets you readily take, say, a database from work to home and back it up without worrying about which copy is most current.

Carrier prices range from about $16 to more than $100, and we can't see justification for the big price gap. They are available both for IDE or SCSI drives.

If you go first-class and decide to set up removable carriers for your main and backup drives, it'll probably soon occur to you that if your main drive dies you'd have another edge over traditional backup methods. Pull out your dead main drive and shove the backup drive into Slot 1, and you're up and running in seconds, without even having to restore from the backup drive. It's a truly plug-and-play backup system!

To make this work, you must know some tricks. First, when you remove that first dead drive the second one will go from a slave drive in a two-drive system to being an only drive on a one-drive system. If you don't reset its **jumpers** (small hardware switches) to advise it of its change of status, it probably won't run. Second, if your second/backup drive is normally D: it will politely change itself to C: when you swap it in. But that may not be enough to make it take the role of the bootable drive. If that second drive has never been set up with FDISK as a primary partition *and* as an "active" partition (as it would have had it started life as your first drive) it won't boot. So if you're just starting this game with a new second drive, before you put anything on the backup drive be sure to use FDISK to set it up with those characteristics. To learn more about using FDISK, type **help fdisk** at a DOS prompt. If you already have that second drive running with data on it and are reluctant to wipe it clean and start over, you can set its first partition active by using the third-party utility *PartitionMagic* from PowerQuest.

You may decide you like this drive carrier idea so much that you'd eventually like to have a whole mess of hard drives to swap in and out. One great use for this approach is to put your child's system on his own drive so he can't possibly get into your data. The multidrive setup is also great for running multiple operating systems. If you take this route, be sure to purchase as many carriers as you anticipate eventually needing. There is no standard for interchangeable carriers, and if you return to the clone store where you got your first one six months later and they've switched brands, you may no longer be able to find a second drawer (drive carrier) compatible with your first one. See the end of this article for information on makers of removable hard drive accessories.

Even if your second drive is removable and bootable, there's still one remaining Achilles heel. You're unlikely to keep six removable drives and rotate them as older backups. So, unlike with tape, Zip, or Jaz removable backup, you won't have several increasingly older fall-back backups. Why is this important? Because of the too-common problem of hidden data corruption. Data, particularly financial data, can get corrupted without you noticing for several days. In the meantime you're backing up corrupt data onto your only good backup. When you notice the problem four days later, you restore from your trusty second drive and discover in horror that it, too, has corrupt data. The only way around this trap is to buy several drives or occasionally do a backup on some other media (tape, Zip, etc.) too.

Stay aware of the limitations of using a second hard for backup. But if you use our techniques to try using a second drive for backup, particularly if you make it removable, you'll wonder how you ever lived without it. ■

by Alexander Censor, M.S.

For More Information:

A-Pro Computer

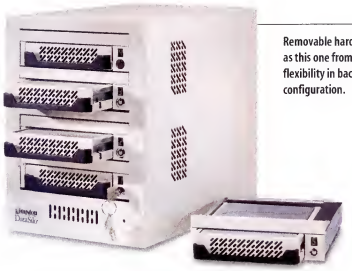
(800) 203-8528
http://www.a-pro.com/mbrack.htm

Kingston Technologies

(888) 435-5460
(714) 438-1850
http://www.kingston.com

J.D. Research Inc.

(714) 282-3995
http://www.jdresearch.com/mobile.htm



Removable hard drive setups such as this one from Kingston provide flexibility in backup and system configuration.

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A Spin With Rewritable CD Drives

Cutting Your Own Discs Gets Practical

Illustration: Jon McKinley

FALLING PRICES are a good sign of a technology taking hold—or a technology on clearance. In the case of recordable and rewritable optical storage media, plummeting prices indicate the former. When CD-Rewritable (CD-RW) drives appeared, the discs sold for around $25 each; now you can get them for around $10 and recordable discs for $1. Because of this, these drives are moving onto home and corporate desktops as a reliable backup method and a CD production tool. (*NOTE: CD-RW drives will work with recordable and rewritable media, but they can write only once to CD-Rs. CD-RWs can currently be read only by CD-RW drives.*)

Recordable CD drives are stable and fast enough to be used on a regular basis. The CD-RW drives we recently tested became just another component of our system—allowing drag-and-drop ease for hard drive backups and, through the Adaptec *Easy CD Creator* and *Direct CD* software included with most drives, easy CD copying and creation.

Even with the same software interface, there is still a wide variety in drives. There are Small Computer System Interface (SCSI) drives that use the faster connections of SCSI cards. Parallel port drives have a slower connection but can be connected to virtually any PC. Internal drives take up no desk space.

Internally Loaded

Installing internal components can be complex, but the internal drive we tested, Acer Peripherals' CD ReWriter CRW 6206A (800/ 369-6736, 408/434-3300, http:// www.acerperipherals.com), provided a smooth process. The drive fits into an open bay in your PC as does your current CD-ROM drive. The only problem occurred when the audio cable wouldn't connect to our SoundBlaster sound card, meaning we couldn't listen to CD sounds through the sound card. After we rebooted, our system recognized the drive, and we installed the default software without difficulty.

Before we could use any CD-RW media, we first had to format the discs, which took about 50 to 55 minutes with each of the drives. After a disc's one-time formatting, you can just erase the CD-RW, which took only a minute or two on the drives reviewed.

CD-RW internal drives are often cheaper (Acer's is $299) and less intrusive to your desktop, as long as you have the space inside.

Parallel Portability

Hooking up the HP SureStore CD-Writer Plus (800/637-7740, 650/857-1501, http://www.hp.com) amounted to plugging the drive into our parallel port, plugging it into an outlet, and installing the software. There's no digging around inside the case, plugging cards or cables into the motherboard.

This makes the SureStore an excellent drive for transporting information from PC to PC. Normal CD-ROM drives won't read CD-RWs, but you can get around this dilemma by simply taking the drive with you.

The SureStore had almost the same performance as other types of drives (even with the slower parallel port connection), and it's easier to set up and move around. But at $610, these extra capabilities will cost you.

The SCSI Connection

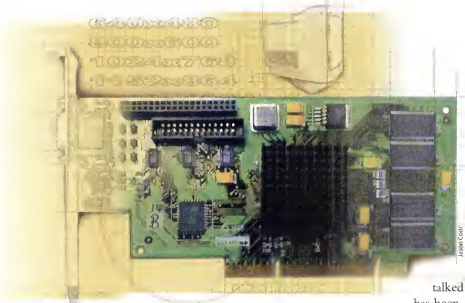
The MCA-CDRW 226 from Mitsubishi Chemical America (800/ 347-5724, 408/232-6253, http:// www.m-kagaku.co.jp) is a SCSI drive, meaning you must install a SCSI card (included with the drive) in your PC and plug the drive into the card. It's an external drive, so you can transport it, but only to another SCSI-equipped PC, unless you want to move your card, too (trust us, you don't). The drive comes with an extra SCSI connector, letting you connect another SCSI device to the port in a **daisy chain**.

This unit's RCA jacks let you connect CD players, receivers, and video cameras. With the right equipment and software, you can make video CDs, cut your own albums, and so on. The drive is expensive at $699, but it's an excellent choice for high-end multimedia users.

Since we looked at three types of drives, our recommendations depend on your needs. If you're willing to sacrifice an extra drive bay, an internal drive like Acer's CD ReWriter is the best value, offering good speed for the lowest price. But if portability is a requirement, we really liked how quickly and easily we could move HP's SureStore CD-Writer Plus parallel unit from one computer to another. ❚❚

by Joel Strauch

Graphics Cards



Jason Cook

YOU'VE BEEN STARING at your monitor all day, and you're starting to get a headache. It seems smart to crank your monitor's resolution to a respectable 1,024 by 768, so you can see more of your spreadsheet at once. But your computer will only let you set it to 800 by 600, at a refresh rate of less than 70 hertz (Hz)—thus the headache.

Meanwhile, a friend just sent you an E-mail message with a photo of his new baby, but it looks terrible displayed in the mere 256 colors your system supports. Don't blame your monitor. You may need a new graphics card.

The graphics aspect of computing has advanced rapidly in a short period of time. The advancements in graphics hardware combined with reasonable prices have helped bring about a strong emphasis on graphics in the software community. Once found only in games, three-dimensional (3-D) graphics are starting to appear in business applications and on the World Wide Web. And improvements in videoconferencing technology along with the promise of Digital Video Discs (DVD) packed with high-quality video, reinforce the need for robust graphics capabilities on PCs.

Project Overview

Tools
Screwdriver

Time
10 to 15 minutes

Cost
$75 to $1,000+

Benefits
Faster graphics and video for 2-D and 3-D applications; higher resolutions, color depths, and refresh rates.

Leading Companies
Graphics Cards: ATI Technologies, Diamond Multimedia, STB, Matrox, Canopus Corp., Number Nine Visual Technology Corp., and Hercules Computer Technology.
Chipsets: nVidia, 3Dfx, Rendition, ATI Technologies, and S3.

Revamped Video Acceleration

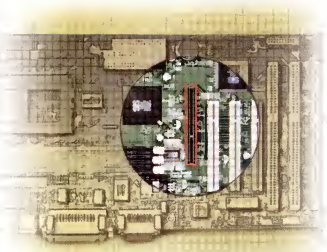
In the past couple of years, the most talked about advance for graphics hardware has been **Accelerated Graphics Port (AGP)**, a Intel's new system bus dedicated to graphics. AGP graphics cards take advantage of the new **bus** (a data highway inside the PC) by creating a shortcut among the graphics card, the computer's system memory, and the central processing unit (CPU). This leads to more efficient graphics and better system performance. AGP cards are inserted into an AGP slot on the computer's motherboard.

Prior to the implementation of AGP, graphics cards were inserted into **Peripheral Component Interconnect (PCI)** slots. PCI slots are commonly used for computing devices such as sound and video capture cards. PCI graphics cards, which transfer data at 132 megabytes per second (MBps), are still readily available and commonly used. The first generation of AGP cards (commonly referred to as AGP1X), however, can transfer data at up to 266MBps. AGP2X, which is more common than 1X, has a peak transfer rate of more than 500MBps. For more information on AGP, see "What's AGP To Me?" in this issue.

Even if you can't use an AGP card, you still can benefit from a new PCI graphics card because it can speed up your 2-D and 3-D applications. Programs such as *Lotus 1-2-3*, *Microsoft Word*, games, and graphics applications benefit from the graphics acceleration. Furthermore, a new and improved graphics card, with a substantial amount of memory, will let you set your monitor to a higher resolution and display more colors while maintaining a respectable **refresh rate** (the

number of times per second on-screen images are redrawn).

Ken Wirt, vice president of corporate marketing for Diamond Multimedia Systems Inc., says, "When you're doing a spreadsheet, you might want to get a lot of information on the sheet so you can see it all at one time." But to do that, your graphics card must be able to place more pixels on-screen by supporting the higher resolution. (*NOTE: Your monitor must support the higher resolutions and color depths. Check your monitor's documentation or ask the manufacturer to make sure your monitor can keep up with your graphics card.*) He points out that the ability to display more colors means that the colors in images are more accurately reproduced. And a higher refresh rate cuts down on-screen flicker, reducing the toll on the user's eyes.



Make sure you insert your graphics card into the appropriate slot. AGP cards go in the brown slot (left), while PCI cards go in the cream slot (right).

3-D For You & Me

Games are the proving ground for new advances in graphics hardware, particularly 3-D. But these advances are filtering their way into the mainstream in areas such as business applications.

Wirt says most business applications don't use 3-D graphics, but he says that will change because displaying information in this fashion makes it easier to quickly analyze data. "There's getting to be more and more…applications which can animate a spreadsheet into 3-D charts where the bars and lines and objects move over time."

Sounds great, right? But how do you choose the right graphics card from the masses? We'll show you what to look for when you're choosing a graphics card.

It's In The Cards

Graphics cards typically come in either a 2-D/3-D configuration, or a straight 3-D configuration, which can work in tandem with your existing 2-D graphics card. The 2-D/3-D cards are more common and typically cost less. Furthermore, straight 3-D cards usually have gamers in mind rather than business users. A 2-D/3-D card gives you the best of both worlds—acceleration for common 2-D applications, while allowing for 3-D imaging. Examples of quality 2-D/3-D cards are Diamond Multimedia's Stealth II G460 and Viper V550, ATI Technologies' Xpert 98, and the Hercules Thriller 3D.

You'll probably notice while shopping for a graphics card that vendors seem to make a big deal out of which **chipset** powers their cards. A chipset is like a mini-CPU that is built into the graphics card that processes graphical data. Graphics card manufacturers often purchase chipsets from other companies and include them in their graphics cards, rather than creating their own proprietary chipsets.

The competition among chipset manufacturers is hot right now, which has kept prices down for graphics cards. The increased competition also has encouraged chipset manufacturers to keep product quality high, while promoting innovative new designs.

The chipsets are so good that several have developed excellent reputations. Graphics geeks look for graphics boards that use a specific chipset. Some well-respected chipsets are the Voodoo II by 3Dfx, the Riva TNT 128 by nVidia, Virge by S3, and Verite by Rendition. ATI Tech's chipset, the Rage Pro Turbo, also has an excellent reputation, although ATI Tech does not sell its chipsets to other vendors.

The price of most graphics cards is less than $300, but a some specialty graphics cards cost more than $1,000. These cards, which are loaded with memory and several high-end features, are targeted toward professionals who know a lot about high-end graphics computing.

Another feature of graphics cards is how many bits the card can process. The most common are 64-bit cards, but 128-bit cards are beginning to appear. Wirt says the faster 128-bit cards are a little better than 64-bit cards, although users probably won't notice a difference between the two.

Monstrous Memory, Minimal Cost

A graphics card's amount of memory is nearly as important as the chipset. Currently, eight megabytes (MB) of memory are standard on new graphics cards. This should be enough for the average user, but those who use graphics often will benefit from a card with 16MB. Wirt says more memory is always the better option. Stay away from 2MB or 4MB video cards, as they can compromise system performance and how high you can set your resolution and other settings.

Here's an example that illustrates how much memory is required to create an image on your monitor. Let's say you want to set your monitor's resolution to 800 by 600, and you want to set the color depth to 16-bit color, which allows your computer to display about 65,500 colors. These are hardly steep settings for today's

monitors and graphics cards, but check out how much video memory is required to display a single 2-D image on your monitor. Sixteen-bit color means that each individual **pixel** (the smallest individual component of a picture) in the image is capable of displaying any of 65,500 colors at any time. So the computer must assign 16 bits of video memory to each pixel. Sixteen bits equals two bytes of data. So, take two bytes times the total number of pixels in the image. To determine the total number of pixels, take 800 times 600, which equals 480,000 pixels. Take the 480,000 pixels times the two bytes of video memory that each pixel requires, and you come up with 960,000 bits of data, or 1MB.

That's right, one full megabyte of video memory to display a single image at a low resolution. When you add in other factors, such as the refresh rate, and any 3-D imaging (called the Z-buffer), the memory requirements become steeper. If you want to run at really high resolutions in *true* color (24-bit or higher), you'll definitely need more than 4MB of memory. Let's say you want to set your resolution to 1,600 by 1,200 at a 24-bit color depth. That would require 5.7MB of video memory, not including the extra memory required for the refresh rate and 3-D rendering. If you really want to punch up your graphics, you need a lot of memory.

Fortunately, video memory is very inexpensive right now. You can obtain a graphics card with 16MB of video memory for about $20 more than the same card with 8MB of memory. Graphics card vendors can afford to do this because, Wirt says, they pay only about $1.50 per megabyte of video memory.

A couple of memory types are commonly used in graphics cards: Synchronous Dynamic RAM (SDRAM, sometimes referred to as SGRAM in graphics cards) and Extended Data Output RAM (EDO RAM). There isn't much difference in cost, so go for a graphic card with SDRAM. It's a little faster.

One last consideration when buying a video card concerns what types of graphics drivers, or graphics **Application Programming Interfaces** (**APIs**), it supports. The most commonly used and supported drivers are the DirectX drivers from Microsoft such as DirectDraw and Direct3D. Silicon Graphics has created another popular API called OpenGL. 3Dfx Interactive also created an API, called Glide. Ideally, you should find a card that supports all three APIs. You should be fine if you buy a card that supports both DirectX and OpenGL, however, as those are the two most common APIs.

Plugging It In

Now that we've covered the major buying considerations, it's time to cover the card's installation. The method of installation is nearly identical for AGP and PCI cards. It's just a matter of sticking the card in the proper slot.

PCI cards, whether for graphics or any other peripheral, are installed in the white or cream-colored slots on the computer's motherboard. The slot for AGP cards looks like a PCI slot, but is brown in color. Don't attempt to insert an AGP card into a PCI slot.

Begin by shutting off your computer and any connected peripherals, such as a printer, and remove the computer's case. If you already have a graphics card installed, remove it now. If you have a graphics adapter built into the computer's motherboard, you need to disable it. Consult your computer's documentation for the proper way to do this for your system. Now, locate the appropriate slot for your new graphics card—white for a PCI card and brown for an AGP card. Hold the card at both ends, line up the gold connectors at the base of the card with the slot, and gently but firmly rock it into place.

Once the card is installed, replace the cover, plug your monitor into the graphics card, turn on the computer, and install any included software. The instructions for software installation will be included with the card.

You'll probably see the benefits of your new card pretty quickly, especially if you run any graphics-intensive programs. Eight megabytes of memory and a good chipset will go a long way toward punching up your computer's graphics. So buckle up and enjoy the ride. ■

by Michael Sweet

Terms To Know

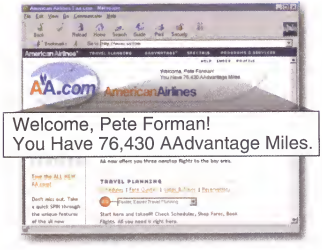
color depth—The number of colors that can possibly be displayed. Common color depth settings are 256 colors, 16-bit (65,500 colors), and 24-bit (16.7 million colors, also called "true color"). Some high-end graphics cards can display 32-bit color depth, which potentially could display billions of colors.

frame buffer—The section of video memory reserved for the creation of on-screen, two-dimensional (2-D) images. The image that appears on your monitor is first assembled in the frame buffer, which calculates the colors each pixel will use and the number of pixels in an image.

resolution—The number of pixels (picture elements) in the monitor image. For example, if your monitor is set to a resolution of 800 by 600, that means the image consists of 800 horizontal pixels per line by 600 vertical pixels per line, for a grand total of 480,000 pixels.

Z-buffer—This is where the illusion of three-dimensional (3-D) is processed in video memory. The Z-buffer provides the image with a z-axis, which creates the 3-D illusion. It keeps track of the depth of objects, as well as which objects appear in front of or behind other objects.

It's 3 a.m. do you know where your current mileage balance is?



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Hard Drives On The Outside

External Drives Offer Simple Storage Upgrades

WHEN THINGS BECOME crowded on your PC's hard drive, it can be tempting to look at new computers. That easy route removes the hassle of installing a new drive, plus you get all the hot features of a new PC. But consider upgrading your hard drive the easy way instead.

External hard drives offer a quick, simple option for users who break into a cold sweat at the thought of touching a PC's insides. If you can attach a printer or joystick to your computer, attaching a hard drive will be effortless. External hard drives, not to be confused with removable media systems such as tape drives, simply plug into a parallel or PC Card port. With externally connected models, hard drives are no longer scary devices requiring technical expertise to install. A pleasant extra bonus is the ease with which you can transport the drives between home and office. These units, such as the parallel port models from Interactive Media Corp. (http://www.kanguru.com), and PC Card models from Kingston Technologies (http://www.kingston.com) could be the easiest upgrade you ever attempt. (For information on removable hard drives, see "Back Up To A Second Hard Drive" in this issue.)

In the past, the external hard drive market focused on telecommuters, sales representatives, or those using high-end graphics applications with images that required a lot of space. Today, everyone wants more storage capacity, and an external hard drive is a great solution. Not only can you bypass digging inside your computer to add storage, but these drives are designed for portability, which means you can share all the information on your hard drive with a portable, home, or office PC, and you need only a parallel port or PC Card slot.

When you're ready to set up the hard drive, simply plug it into an assigned port and install the corresponding software. Some drives don't even require extra software. When you start up Windows, the drive will be detected and you can access the drive just as you would a diskette.

Most roving professionals want access to all their files for every application, whether they're using a desktop or portable PC, and external hard drives offer additional storage as needed, wherever it's needed. These drives are an attractive place to store highly sensitive material such as secure financial information because they can be disconnected from a system and put in a safe place until needed again. Some users may opt to use separate hard drives for various records, such as one for personal, payroll, and office applications, to organize all important data.

Although numerous external storage devices are available, such as Zip or tape drives, removable hard drives enjoy the advantages of larger storage capacity and swift data access times, which reflect the time it takes a storage device to transfer data to the PC. External hard drives are nearly as speedy as internal models, although when you connect an outside peripheral via a parallel or PC Card slot, you may lose data transfer speed. For example, an external hard drive connected to a PC Card slot might have a transfer rate of 16.6 megabytes per second (MBps), while a high-end internal drive could transfer 30MBps.

Those considering a tape storage device can plan on using multiple tapes for backup and coordinating an organization system for the numerous tapes. Or, you can just plug in an additional hard drive and fill up an additional 6 gigabytes (GB) in a snap.

The Cons

There are some slight drawbacks to using an external hard drive, such as the additional clutter of placing another device on the desktop. For portable computer users, a removable hard drive represents another component to carry, although some drives will fit easily into a shirt pocket or handbag.

Prices are typically about the same for internal and external drives of similar capacity, but fluctuating prices mean the best deal is always changing.

External hard drives are easy to find, either on the Internet or in your local computer store. If you're seeking a simple, mobile solution to your lack of storage, one of these drives could be a sound investment. ■

by Buffy Cranford-Petelle

Desktop Systems

The Future Is Now

Gateway G6-350

$1,469
Gateway Inc.
(800) 846-2000
(605) 232-2000
http://www.gateway.com

Every once in a while, a system appears on store shelves that completely surprises you with its power and presence. The G6-350 mini-tower system by Gateway is such a system. At a price less than $1,500, it boasts a Pentium II 350 megahertz (MHz) processor and includes the latest Digital Video Disc, read-only memory (DVD-ROM) drive, a crisp 15-inch monitor, and a sound system that pins you to your seat.

The G6-350 is a comprehensive system with all the essentials for a solid home computer, offering a 6.4 gigabyte (GB) hard drive, a graphics card with eight megabytes (MB) of memory for excellent graphics rendition, and 64MB of random-access memory (RAM). Gateway has emerged as a leader in PC technology by providing a double-speed DVD-ROM drive in place of the typical CD-ROM drive for watching movies, or simply accessing your regular CD-ROMs or audio CDs.

Before you settle back to watch the latest movie on your DVD-ROM player via the G6-350, be sure to attach the Boston Acoustics BA635 speaker system, which comes complete with subwoofer for superb sound quality. The system also includes a US Robotics/3Com V.90 56 kilobits per second modem and a multifunction keyboard. Gateway improved the top of a standard keyboard design by including controls for the DVD-ROM drive, system volume controls, and buttons to search for messages, use the phone, watch television, turn on the radio, or put the computer to sleep.

The G6-350 excelled in our technical benchmarking tests, scoring especially well on Content Creation, which tests programs such as *Photoshop* and *Extreme 3D*. It scored almost as highly as a few low-end 400MHz systems we've reviewed.

Gateway includes an encompassing software bundle that starts with the basics of Windows 98 and *Netscape Navigator 4.0*. You also receive *Quicken Basic 98*, *Home Essentials 98*, *Greetings Workshop*, *Encarta Encyclopedia*, and a system restoration CD-ROM. An included DVD from Warner music lets you relax and watch a video of Madonna or other artists on your computer. As you begin to collect DVDs or CD-ROMs, Gateway has you covered with a CD holder, along with a phone cable and mousepad.

The included Gateway EV500 15-inch monitor is perfect for the home, rendering bright colors for graphics and crisp text when viewing word processing or spreadsheet documents. A front compartment folds down to provide access to a dial that controls the on-screen display modes. If you turn the dial, a digital menu appears to adjust horizontal, vertical, and other screen alterations. To choose a menu selection, you simply turn the dial to the icon and push the dial in to activate the selection. You turn the dial to find the setting you want, then push it again to save the setting.

The G6-350's setup is effortless, with a 10-step poster showing how to plug in the proper cables, which are color-coded to match connections on the rear of the system. The package also include a quick setup diagram for attaching the speakers, warranty information, and thorough documentation in the user's guide for setting up the system.

In case you wish to add some additional storage components to the system, the G6-350 offers two empty 5.25-inch drive bays and three 3.5-inch bays. There are also two Universal Serial Bus (USB) ports available and audio in/out jacks for attaching headphones, speakers, and a microphone.

The G6-350 offers a bundle of new technology standards that will soon be standard on upcoming systems. If you're searching for the flexibility of DVD, along with a superior sound system, a speedy processor, and plenty of memory, the G6-350 is a solid buy. ■

Buffy Cranford-Petelle

This Month's Reviews

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Printers

Another High "Styl"us Inkjet

We decided Epson makes very good inkjet printers back when we first tested the Stylus Color 600, an inexpensive printer that offered high-quality output. The Stylus Color 640 continues that tradition of fine printing. In fact, we were hard-pressed to notice many differences between old and new.

We tested the printer by connecting it to an IBM 300XL system with an Intel Pentium II 300 megahertz (MHz) processor, 64 megabytes (MB) of random-access memory (RAM), and Windows 95. Setup went smoothly, and the documentation is very good.

The 640 uses Epson's Micro-Piezo inkjet technology, which offers an amazing 1,440 by 720 dots per inch (dpi) maximum. The results are rich, detailed photo reproductions, vibrant color graphs and charts, and sharp, black text. The best results come on specialty papers, but it does fine on plain paper, too.

With print quality consistently high, we focused on speed in tests. Using the lowest quality setting on plain paper, the unit printed a 10-page *Microsoft Word* file in a good time of 5:33. The printer's high dpi slowed it down when we printed a full-page Joint Photographic Experts Group (JPEG) photograph on the highest quality setting and glossy paper, with a time of 17:50. The 640's times were comparable to similarly priced inkjets'. Surprisingly, the 640 took longer than the 600 to print the same JPEG photograph with apparently no quality improvement.

That's not to knock this excellent unit. Epson throws in plenty of top-notch programs, including Adobe's *PhotoDeluxe 2.0;* and Broderbund's *Print Shop Premier Edition.*

Epson lists better image quality and improved transparency handling among the 640's enhancements over the 600, but they were subtle enough to go virtually unnoticed during our tests. That said, the 640 is an excellent printer in terms of quality, speed, and software bundle. Add Epson's Overnight Exchange Warranty, and it's a tough package to beat. ■

Tom Mainelli

Color Stylus 640

$199
Epson
(800) 463-7766
(310) 257-4001
http://www.epson.com

Pointing Devices

Better Mouse Traps Competition

Logitech, maker of quality input devices since 1982, has a complete line of trackballs and mice. That notwithstanding, a certain member of our staff is a stalwart supporter of Microsoft's IntelliMouse and was skeptical about the performance of Logitech's "upstart copycat," the MouseMan Wheel. The MouseMan, however, soon silenced such poohpoohing by combining excellent functionality with broader features than even the mighty IntelliMouse.

At a glance, the ergonomic MouseMan looks like something designed by Salvador Dali, but upon extended use the reason for the design becomes clear. Our skeptic soon found that using his MouseMan caused no physical trauma like the finger numbness the IntelliMouse induced.

The MouseMan's two traditional buttons are joined by a middle wheel that can be used for scrolling through long documents or World Wide Web pages. The wheel also doubles as another button, whose function is chosen by the user from within Logitech's *MouseWare 8.0* software. There are 52 configurations available for this button, some of which include acting as any of the function keys and one-touch double-clicking. The button also can be set to act as the CTRL, SHIFT, BACKSPACE, ENTER, or ESC key. The Cyberjump and Hyperjump configurations create eight-function pop-up menus that let Windows and Internet functions (respectively) be performed at any part of the screen.

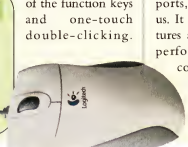
The MouseMan's left side features a fourth button for the user's thumb. This button is placed low along the bottom of the textured rubber grip, so as to be convenient and yet out of the way. This button, like the wheel/middle button, can be configured for any of 52 functions from within MouseWare.

The MouseMan Wheel, which is compatible with both PS/2 and serial mouse ports, scored highly with us. It delivers top-shelf features and smooth, accurate performance. And according to our former skeptic, your hand will thank you. ■

Chris Trumble

Logitech MouseMan Wheel

$60
Logitech Inc.
(800) 231-7717
(510) 795-8500
http://www
.logitech.com



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Monitors

Big Screen Country

Samsung 1000s

$999
Samsung
(800) 933-4110
(408) 544-4000
http://www.sosimple.com

Samsung targets the small office/home office (SOHO) market with this affordable monster monitor boasting a 21-inch screen. The 1000s is 21.5 inches deep, 20 inches high, and 20 inches wide, but don't let its large footprint scare you away from its incredible rendition of photo and graphic images.

We tested the monitor on an IBM 300XL PC with a 300 megahertz (MHz) central-processing unit (CPU) and Windows 98. In the highest resolution, 1,600 by 1,200, the Samsung's colors were bright and clear, and the photo images of tulips were so sharp we could have sworn it was a warm, sunny April day! The lines were straight, the boxes uniform, and the color representation exceptional. None of the images, text, or lines suffered any distortion. Viewing the graphics on a 19.7-inch viewable screen enhanced their clarity.

For word processing or spreadsheets, the 1000s rendered sharp, legible text in both maximum resolution and the next highest setting of 1,280 by 1,024.

The 1000s includes a full set of on-screen controls (contrast, brightness, horizontal & vertical size and position, and color temperature, among others) with an easy-to-use, three-button control configuration. Under the florescent lights of our testing lab, the Ultra Clear anti-reflective coated screen performed extremely well regardless of the degree to which the monitor was tilted.

We had the Plug-and-Play monitor out of the box and running in less than 15 minutes. The CD-ROM and manual that accompany the monitor walk you through the setup with easy-to-follow instructions. If you prefer to use your PC's serial ports for scanners or printers, the 1000s supports Universal Serial Bus (USB) connections with on-screen instructions that walk you through that configuration as well. For energy efficiency, the 1000s supports four stages of power control: on, standby, suspend, and off. All these use progressively less power for an overall reduction in energy consumption. ▮

Katie Dolan

Storage

Diamond Without The Rough

DiamondMax Plus 2500

$390
Maxtor Corp.
(800) 262-9867
(408) 432-1700
http://www.maxtor.com

Maxtor's DiamondMax Plus 2500 hard drive, the company's pioneer in the 7,200 revolutions per minute (RPM) EIDE drive category, is a jewel of a hard drive, at a price comparable to cubic zirconia.

Probably the most impressive feature we noticed in our testing was that the DiamondMax Plus used only 30.4% of the central processing unit's (CPU's) power (whereas **Enhanced Integrated Drive Electronics** [**EIDE**] drives typically hog about 70% of the CPU's power), even at a data transfer rate of six megabytes per second (MBps)—a speedy surprise considering its EIDE roots.

EIDE drives have, until now, been considered much slower and less efficient than **Small Computer System Interface** (**SCSI**) drives for viewing streaming graphics and sound files because of their high CPU usage percentages. The Plus 2500, however, performed with a CPU overhead well below most EIDE drives in our tests. (*NOTE: You should be less concerned with the CPU usage than with the data transfer rate, which serves as the heart of a drive's performance.*)

The DiamondMax Plus also features **digital signal processing** (**DSP**), a special circuit meant to allow high-speed data transfer and manipulation rates, making this hard drive a perfect candidate for working with digital video and other multimedia ventures.

The Plus 2500 features **magneto-resistive heads** (**MR**), which detect and avoid sensitive, magnetized areas on the disk. This technology prevents some potentially nasty hard drive errors.

DiamondMax Plus comes in storage capacities of 7.5 gigabytes (GB) and the 10GB model we tested. Both offer Maxtor's patented *Formula4* **head-disk assembly** (**HDA**), which smooths rough moments in the drive's life by inducing quieter operation and acting as "shocks" to prevent vibration and slippage. *Formula4* enhances capacity and speeds, all for a reasonable price. ▮

Kay Prauner

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Uncommon Audio

Montego A3DXstream

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(800) 233-9377
(914) 966-0600
http://www.voyetra.com/tbwelcome.htm

Not all sound cards are created equal, as the Turtle Beach Montego A3DXstream aims to prove. This card adds a few uncommon features to the usual sound card options.

The A3DX's main attraction is its support for Aureal 3D positional sound (A3D), a method of rendering three-dimensional (3-D) sound effects that many say is superior to Microsoft's DirectSound 3D standard. A3D is steadily gaining support in the industry, with more software vendors incorporating the technology into their programs.

The card still supports Microsoft's DirectX sound drivers, of course. This gives the A3DXstream tremendous flexibility in reproducing sound. It supports every common PC sound standard, so you should never run into sound problems, no matter what program you run.

The A3DXstream is a PCI audio card. Unlike traditional ISA audio cards, PCI audio cards require little attention from the central processing unit (CPU), letting it focus on other tasks. This leads to greater system efficiency and possibly a noticeable performance boost.

This is a 64-voice, wavetable synthesis card, which means that up to 64 instrument sounds (voices) can be played at one time. The voices sound great, thanks to the wavetable synthesis, which can more accurately reproduce sounds than the old-fashioned FM synthesis.

The card also offers a 48 kilohertz (KHz) sample rate, which means you can record sounds at higher than CD quality. In fact, the card includes a software suite that is excellent for recording and playback. The software also includes some demos, which really let you hear the difference good 3-D audio can make in an application. We've never used a card that can reproduce 3-D sound with 100% accuracy, but this card comes as close as any.

If you're looking for a quality sound card alternative to Creative Labs or Diamond Multimedia, try the A3DXstream. It will satisfy your audiophile cravings. ■

Michael Sweet

Modems

Mostly Great

The Apache 56SP-RA could have been a great small office/home office modem. It offers fast data connections, send/receive fax capability, a speakerphone for hands-free talking, and a nice fax software suite. Unfortunately, it's hard to set up.

In fact, this 56 kilobits per second (Kbps) modem's setup was one of the most difficult we've encountered. It's not Plug-and-Play compatible, meaning Windows 95 and 98 won't auto-detect the modem and install the appropriate device drivers for you. Manually installing the drivers dragged on for more than half an hour before we finally had the modem properly configured.

We were also disappointed to find that the modem's touted *AutoConfig* software had to be run from DOS—and not just a DOS shell launched inside Windows. You actually must restart the PC in MS-DOS mode, then dig through directories in DOS to find the program. In short, it's not a matter of simply clicking an icon in Windows, which, it should be in 1998, and already is with most other modems.

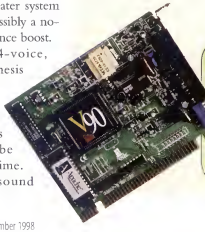
Those complaints aside, the modem and its software suite are almost worth all the trouble. The fax software offers a feature that's rare in modems we've seen: the capability to "broadcast" faxes, sending them to a list of phone numbers.

The voice-mail software was also much better than other software packages we've looked at. One of the handiest features was a hierarchical chart illustrating how voice calls would be routed from mailbox to mailbox, or announcement to mailbox, etc. This makes it easy to see how calls are routed, plus it helps you keep track of where you are when recording mailbox greetings or announcements.

The modem performed comparably to some of the fastest 56Kbps modems we've seen and comes with the new V.90 standard as well as the older K56Flex standard, precluding most compatibility problems.

With these features in mind, if you're adventurous enough to try installing this modem, give it a shot. You'll probably find the features worth it. ■

John Lalande



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Hard Drives

Recovering Data From A Troubled Hard Drive

When it comes to a computer's internal organs, few are as vital to the system as the hard drive, and none is as valuable to the user. Sure, you might lose the use of your computer temporarily if the processor goes kaput. But after a quick transplant, it's back to business as usual. But the problem isn't so easily solved when your hard drive dies. Lose your hard drive, and you'll lose millions of bytes of irreplaceable data. You can buy a new hard drive, of course, but you still have to get by without the lost information. Ask anyone who has ever experienced the phenomenon known as a "hard drive crash," and you'll quickly learn how frustrating it is to lose a hard drive.

Fortunately, most hard drive problems don't have such devastating results. With a little know-how, you can remedy the small problems before they become big ones. And with a little more know-how, you can prevent the small problems. The truth is, you can't do anything for your drive unless you know a little about it first.

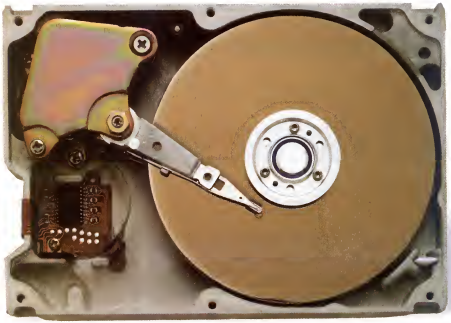
Hard Drive Basics

A hard drive is a desktop or portable computer's primary means of data storage. The hard drive consists of five main components: a number of thin, rigid, circular disks, called **platters**, on which data is stored; the **read/write heads** that read data from and write data to the platters; an **access arm** that holds the read/write heads; a **head actuator**, which controls the movement of the access arm; and a **spindle motor**, which spins the platters at an extremely high rate of speed. These internal mechanisms typically are encased in a metal box that is connected to the computer's frame.

Today's PCs hold a substantial amount of data. They usually come equipped with a hard drive that has a capacity of 1.6 **gigabytes** (**GB**, a little more than 1 billion bytes) to 8GB. This means there is a lot of room for error. To avoid frustrating situations, computer users must be diligent in performing drive maintenance and must be aware of situations that could prove disastrous to a hard drive and its stored data.

Installation Problems

It's important to point out the majority of all hard drive problems occur during installation. If you can get the drive up and running, you'll have eliminated the source of most hard drive problems.



Every computer installation is fraught with peril. We've all heard the stories of systems that worked perfectly until new components were added. Of course, in some of these cases, the new component actually was the culprit. But most of the time, problems occur because the person performing the installation didn't read and follow all the directions, says Richard Haggan, technical support supervisor at Maxtor Corp.

"They tend to jump right in there and they forget some steps, whatever they may be," says Haggan. "Then we have to backtrack." It's always a good idea to read the directions completely before beginning an

installation. That way, you'll be prepared for what comes next. And because you'll understand the entire process, you'll be less likely to skip a step you think is unimportant.

Of course, the installation instructions aren't always the easiest thing to understand and problems will crop up. Some of these are caused by human error.

For example, if the hard drive's power cable isn't connected correctly, then the drive won't work. One way to identify a problem with the power connection is to look at the tiny lights on the front of your computer. One of those lights is linked to the activity of the hard drive. When the hard drive is working, the light flashes. If that light doesn't come on when you turn your computer on, the hard drive probably isn't getting any power and you need to make sure the power cord is connected properly.

Another example of a problem caused by human error is an improperly connected data cable. If the hard drive indicator light flashes when you turn the computer on, yet you can't access the drive, then you can suspect this is the problem. This isn't the only reason for an inaccessible hard drive, but it's an easy one for you to fix. Besides, you don't want to waste your time calling technical support only to be told you didn't connect the hard drive to your system correctly.

To double-check the cable connections, remove the cover from your computer and locate the hard drive. It looks like a metal rectangular box and will be secured to the frame of the computer. The computer's users manual should tell you where it is if you can't find it.

After you locate it, see if it has two cables plugged into it. One cable actually consists of as many as four separate cords and probably has a plastic plug on one end; this is the power cable. The other cable looks like a wide ribbon; this is the data cable. Make sure the cables are connected securely to the drive. When you're certain they're connected properly, put the cover back on the computer and start it up. If the drive works, then it looks as if you've solved the problem.

"NO ROM BASIC"

This error message appears because the primary **partition** on the **master** (primary) hard drive isn't set to active.

What's a partition? Well, in simplest terms, it's an area on your hard drive that is treated as a complete storage unit. Each partition is divided into uniformly sized smaller compartments called **sectors**. Data is stored in groups of sectors, called **clusters**, and each cluster can store a maximum of one file.

Hard drives can be set to have more than one partition. Although this rarely happened with the smaller hard drives of yore, it happens quite regularly with today's multigig drives. Each partition is treated as a separate hard drive and has its own drive letter assigned to it.

If your drive is divided into multiple partitions, one of these partitions must be designated as the primary one; this is where the operating system is stored. If this partition isn't set as active, then you'll receive the NO ROM BASIC error message.

Setting the partition as active and solving the problem can be accomplished using FDISK, which is a DOS utility, or using the proprietary software that came with the hard drive. Which one you use will depend on which application you used to set the partitions originally. Because every manufacturer's software is unique, we'll show you how to set a partition as active using the universal FDISK.

(*NOTE: You'll need a bootable diskette if you plan to use FDISK. You should have created one of these when you first installed your operating system. If you don't have one, you can contact your computer's manufacturer and ask for one.*)

Insert the bootable diskette into the diskette drive, then turn on the computer. When the DOS prompt appears, type **fdisk** and press ENTER. At the resulting list of options, select Set Active Partition. Follow the on-screen directions for setting your main partition. You'll need to know the letter (probably C) assigned to the partition. The program will set the partition active and return you to the main menu. Press ESC to return to the DOS prompt.

Partition Comparison

The size of a cluster is determined by the size of the partition. This chart shows the typical cluster size and the number of sectors in a cluster for some standard partition sizes.

PARTITION SIZE (in megabytes)	SECTORS PER CLUSTER	CLUSTER SIZE (in kilobytes)
0 to 15	8	4
16 to 127	4	2
128 to 255	8	4
256 to 511	16	8
512 to 1,023	32	16
1,024 to 2,145	64	32

Usage Problems

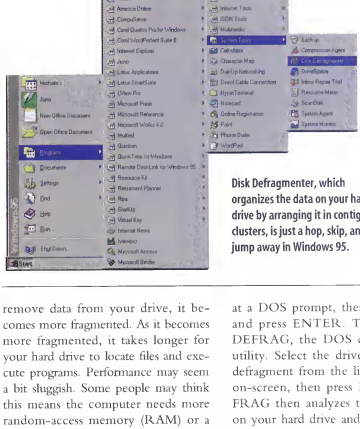
After repeatedly writing and erasing data from the hard drive, the platters start to get a little dirty. We are not talking about dust and grime. Rather, we are talking about pollution of bytes and bits.

You see, when you write data to a hard drive, it is divided into sections (unless it's a small file, then it stays in one piece) and stored methodically on the drive. The location of the data is registered in the **file allocation table (FAT),** which keeps a record of where the data is stored on the drive. Your hard drive becomes a colossal warehouse, with thousands of information crates stacked in neat piles. And if all you ever did was write data to a drive, these piles would stay in the same place and you wouldn't have to worry about data integrity.

But you'll probably have to delete files, and that causes problems. You see, the file actually isn't deleted from the drive. Rather, reference to the file is deleted from the FAT. When new data is stored on the drive, it is recorded over the old data. And instead of storing the data in contiguous sections, it fills in the gaps left behind by deleted data.

Think of it in terms of our colossal warehouse. When you want to remove an object from the warehouse, the crate in which it is stored is not removed. Rather, the object is removed from the case and the crate is marked as available in the warehouse foreman's register. When a new shipment of objects arrive, they don't get a new pile, or even new crate, to themselves. Instead, they're distributed among the many crates that are marked available in the warehouse foreman's register. As more objects leave, more arrive to take their places. Soon, similar items are stacked in various piles and the organization of the drive depends entirely on the warehouse foreman's register.

When this phenomenon of scattered data happens to your hard drive, it's called fragmenting. As you add and remove data from your drive, it becomes more fragmented. As it becomes more fragmented, it takes longer for your hard drive to locate files and execute programs. Performance may seem a bit sluggish. Some people may think this means the computer needs more random-access memory (RAM) or a new hard drive. Actually, what it needs is a healthy defragmenting.



Disk Defragmenter, which organizes the data on your hard drive by arranging it in contiguous clusters, is just a hop, skip, and jump away in Windows 95.

Defragmenting (or **defragging** as it's often called) is as easy as a few points and clicks in Windows 95 (Win95). Open the Start menu, select Programs, and choose Accessories. Select System Tools from the list of options, then click Disk Defragmenter. Up pops a Select Drive window, asking you to choose the drive you want to defrag. Select the drive, then click OK. If your drive is in bad shape, the Disk Defragmenter immediately starts defragmenting the selected drive.

If your drive isn't in bad shape, however, you'll see a message indicating you don't need to defragment the drive right now. Because defragmentation takes a long time, especially if you have a high-capacity drive, we recommend you click the Exit button and wait to defragment your drive until you need to do so.

If your computer runs Windows 3.x or DOS, the process is basically the same. Exit Windows so you're looking at a DOS prompt, then type **defrag** and press ENTER. This initializes DEFRAG, the DOS defragmenting utility. Select the drive you want to defragment from the list that appears on-screen, then press ENTER. DEFRAG then analyzes the data stored on your hard drive and suggests a defragmentation option..

And if your drive doesn't need to be fragmented, DEFRAG will tell you that. In that case, just select OK, press ENTER, then select Exit, and press ENTER again to exit DEFRAG and return to the DOS prompt.

When do you need to defragment your drive? Carl Salter, a senior technician with Maxtor Corp., says that depends on how you use your computer. If you install and uninstall lots of programs and files, you should defragment quite often, perhaps monthly, says Salter. But if you tend to use the same programs and don't add and remove files on a regular basis, you're probably safe defragging your drive every six months or so.

(*NOTE: The DOS and Windows defragmenting utility is meant to be used on uncompressed drives.* ***Disk compression*** *is a means of reducing the amount of disk space required to store a file; essentially data is squeezed so it fits into a smaller space on the drive. Most drive compression utilities have their own defragmenting applications; use those defragmenting tools.*)

Can't Boot From Drive

Booting a computer isn't as violent as it sounds. A boot, when you're talking about computers, refers to a computer's process of executing the basic startup routine as dictated by the BIOS. During the process of booting up, the computer looks to a particular drive or drives (designated in the BIOS), where it can find the information it needs to get itself going.

If the computer looks to this drive and can't find this information, it will halt the setup and an error message will appear on-screen. If this happens to you, there are a number of possible reasons.

The first and most obvious reason is that you might have a diskette in the diskette drive. On most systems, the Basic Input/Output System (BIOS) tells the computer to look first to the diskette drive and then to the hard drive. Usually, the diskette drive is empty and the computer, sensing that, proceeds to the hard drive.

But if a diskette is inadvertently left in the diskette drive, the computer will attempt to boot from it. The computer won't find the information it needs, and that causes the error message. If this happens, remove the diskette and reboot (turn on again) the computer.

Another reason for the error message is not as innocent; you may have acquired a virus that has affected the **master boot record** (**MBR**; the instructions that tell the computer which drive to access during a bootup). This virus takes the place of the MBR when the computer is turned on, making it impossible for the computer to access the information it needs to boot correctly.

Such a virus creates a Catch-22 for the computer age: You need to run an antivirus program to remove the virus, but you can't access the antivirus program because the MBR is corrupt.

Fortunately, there is a solution, as long as you have a bootable diskette. Stick the bootable diskette in the diskette drive, turn the computer off, and then turn it back on again.

Remember when we said a diskette in the diskette drive could cause problems when the computer is turned on? Well, in this case, the diskette will solve your problems. The bootable diskette contains the operating system information for which the computer is looking. You won't receive an error message; you'll receive a DOS prompt instead. From there, run your antivirus program, making sure it checks for boot viruses.

If you cannot access your drive even after trying a plethora of troubleshooting solutions, odds are your drive has crashed.

A third reason for this error message is that the MBR may have become corrupt by the installation of more than one operating system on the hard drive. If you have reason to believe your system doesn't have a virus on it or the virus scan comes up clean *and* if you've installed more than one operating system on your hard drive, type **fdisk /mbr** at the DOS prompt. This will extricate the old corrupt MBR and replace it with a new clean one.

Drive Crash

The last and worst problem that could happen to your drive is a crash. This means your drive has died. A crash can be caused by hardware (such as the read/write heads hitting the platters) or by software (such as a virus scrambling the FAT).

The symptoms of a drive that has crashed range from the drive making strange grinding noises to an INVALID DRIVE SPECIFICATION error message. If you cannot access your drive even after trying a plethora of troubleshooting solutions, odds are your drive has crashed.

At this point, if you've backed up your drive religiously, you're feeling mighty grateful that you have and you're mildly annoyed that you're going to have to buy a new drive. If you haven't backed up your drive, you're probably enduring an extremely horrifying experience.

Fortunately, there are some companies, such as DriveSavers (800/440-1904, 415/382-2000, http://www.drivesavers.com) and Ontrack (800/ 872-2599, 612/937-5161, http://www.ontrack.com), that can recover data from a crashed drive.

Safe & Secure

When you stop to think about all the data stored on your hard drive, it's mind-boggling that the drive can be efficiently organized at all. Thankfully, technology does most of the work. All you need to do is carry out a few drive maintenance tasks and periodically take note of how the drive is performing. Hopefully that's all it will take to keep your data safe and secure. ■

by Jeff Dodd

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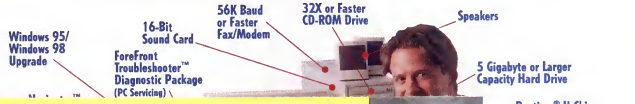
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Can't Boot From Drive

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Beyond The Big Two

Alternative Web Browsers Provide Choices To Navigator & Explorer

THEIR NAMES ARE ALMOST synonymous with "browser" and they split 98% of the market, but *Microsoft Internet Explorer* and *Netscape Navigator* haven't reduced the World Wide Web browser battle to a two-entry race.

Depending on your needs, you might get better Web use with one of the more than 70 lesser-known browsers. Each serves a niche in its effort to survive a market overpowered by the Big Two. Some sell themselves by using fewer system resources or by being easier to use. Others serve special markets such as Web site creators. In general, though, these browsers operate much like the Big Two, presenting Web pages in a central window and including standard navigation buttons such as Forward, Back, and Refresh. The following summary of some of the better-known lesser knowns should help you decide whether one of them is worth a look.

Opera

Opera (http://www.operasoftware.com) is the top underdog, garnishing a 3% sliver of the browser market. Its programmers broke from tradition in 1995 by writing an application not based on *Mosaic* or other previous browser codes. Opera does adhere to the **Hypertext Markup Language** (**HTML**, the Web's programming language) 3.2 standard, letting Web designers know exactly how their pages will appear in any browser.

Opera's designers claim this browser is a viable alternative because of its easy setup, fast page loading, and small size (about 1.7 megabytes [MB], compared to the 12MB to 24MB required for Explorer and Netscape). This browser is designed specifically to operate well on older machines dating back to those using 386SX processors and only 8MB of random-access memory (RAM).

But unlike the Big Two, Opera comes at a price—$35 for a single license copy, with a 50% educational discount for students and schools. Customers can download a free working copy for a 30-day trial.

In our tests, Opera matched the fast page downloading of Explorer 4.0 and Navigator 4.06. Its user-friendly interface proved easy to master and customize. Its generous variety of "hot links" provides quick connections to a range of sites. The drag-and-drop method of pulling sites from Opera's hot list to the browsing window was convenient, as was the automatic importation of "favorite" sites tagged in Explorer and Netscape.

We found that some pages displayed in the browser experienced minor displacement of or extra spaces between images and text, but this didn't interfere with page readability. For the most part, Opera displayed pages exactly like Navigator and Explorer. Its data encryption feature for secure online transactions operates like the Big Two's.

We found Opera a viable alternative to Explorer and Navigator, especially for home- and small-office users, students, or education professionals who access the Web often, own older machines, or must minimize memory use. This flexibility could conceivably justify Opera's initial cost.

Opera 4.0, slated for release in late 1998 or early 1999, will add Cascading Style Sheets, **Java** support (for Java programming elements on Web pages), and integrated E-mail capabilities, as well as a searchable hotlist and better management of **cookies**, files sites use to track your online use.

NeoPlanet

Another alternative for the general Internet consumer is Bigfoot's *NeoPlanet* (http://www.neoplanet.com). This free browser created in 1995 comes with 500 links to a variety of sites in 20 topical categories. NeoPlanet isn't a true standalone browser because it uses the same media rendering engines as Explorer and Navigator for displaying Web sites. But the television-like interface combining the services of browser and search tool, hundreds of pre-selected channels, and a NeoPlanet news service make it worth a second look. Its compatibility with Navigator and

Explorer on Windows 95 and Windows NT platforms enables full Java, Active-X, and plug-in capabilities (in other words, it supports most of the neat gadgets available on leading Web sites). Because it weighs in at only 310 kilobytes (KB), you can download the browser on a 28.8 kilobits per second (Kbps) modem in less than two minutes.

In our tests NeoPlanet accessed pages at least as quickly as Explorer and Navigator and interpreted various site frames, colors, and tables correctly. It also easily imported favorite links tagged in the major browsers.

Despite the numerous links and categories contained in its channels, NeoPlanet's display seemed more user-friendly than Opera's, requiring only a single click to hide or bring back the listing. Its pop-up directory tree and single-click method for viewing and editing channels made customizing this feature a bit easier than in Opera.

HotJava

Although *HotJava* (http://java.sun.com/products/hotjava) can run on regular PCs, the 612KB browser is for simple devices such as kiosks, screen phones, and computers heavily dependent on networks (known as Network Computers). Users easily can customize the interface by modifying menu items and page contents as well as adding graphics and icons.

While this free browser certainly has low storage requirements and features a cool command console design quite different from the Big Two, it didn't measure up in page download speed. Also, colors were not always displayed accurately, and tables and frames often appeared incorrectly formatted. However, HotJava's designers aren't positioning it as a competitor to the Big Two, and these less-than-perfect comparisons probably wouldn't appear for the Network Computer or kiosk user.

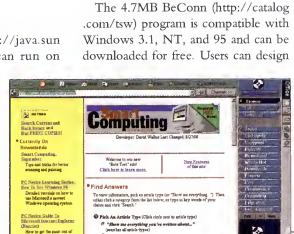
BeConn

The *BeConn* browser is actually more of a communications suite, serving as a combination newsgroup reader, E-mail program, and electronic commerce (E-commerce) application. A main feature of the program is its flexible channels, which are a nice contrast to channels in other browsers, which operate like preset television settings.

The browser's channels include options for **videoconferencing**, working with others over the Web, and **single-word browsing**, letting users type a site's name instead of its full address. BeConn offers the first 1,000 channels free for the first year, with a limit of one personal channel name (through which you can deliver your own information) per company or individual. Afterwards, a $100 annual subscription provides access to most BeConn channels.

The 4.7MB BeConn (http://catalog.com/tsw) program is compatible with Windows 3.1, NT, and 95 and can be downloaded for free. Users can design the look and operation of each channel to facilitate interactive radio or video, direct-to-consumer sales and tech support, long-distance learning, and more. While other browsers offer similar options, BeConn lets users take a more active role in determining the use, style, and specific interactive multimedia options.

We found that while BeConn's interface is unique and it has many possibilities for multimedia applications, the browser's general setup seems too complicated for all but the most serious business Web user. Page downloading was fast, though, and colors and site layouts appeared accurately, although some background colors and graphics appeared "tiled," and a lack of pop-up tags left some button commands a mystery.



Alternative browsers such as *NeoPlanet* put twists on the basic browser look with features such as links to selected sites.

Amaya

Users interested in formatting Web sites and editing Internet content should check out the free *Amaya* browser from W3C (http://www.w3.org/amaya). Amaya was designed to demonstrate new Web technologies by letting users browse and edit Web pages at the same time.

Want to copy and paste Web information to the pages you're editing? How about creating hyperlinks to other Web sites from your document? This browser lets you do it. In addition to the traditional control buttons, Amaya features single-click commands for fixing font sizes, inserting images and heading size levels, and more.

Amaya, which is 1.9MB in size, proved relatively user-friendly. Its What You See Is What You Get (WSIWYG) environment seemed especially helpful for those unfamiliar with HTML. While the backgrounds, colors, and dimensions of forms and lists displayed inaccurately in our tests, Amaya's programmers stress their browser is still "a work in progress" and promised new, better features in the near future.

Although it's easy to feel comfortable with the browser that arrived with your computer, you owe it to yourself to check out at least a few different Web browsers. After all, where would "double-dutch chocolate" be if no one got tired of vanilla? ||

by Lori Robison

Netscape's Latest Communicator

A New Browser Comes Loaded With New Tools

ALTHOUGH THERE ARE THOSE who maintain that the browser war is finished, with no clear-cut winner, the battles will continue to rage—on the network servers, and on individual PCs; through E-mail and newsreaders as well as World Wide Web browsers. With every new skirmish, er, version, tools emerge that make our 'Net access faster and easier. The competition is fierce, the results (at least for consumers) invaluable.

The half-step increase with *Communicator 4.5* is Netscape's latest salvo in the war. The ".5" changes the appearance of this suite of 'Net tools little from version 4.0, but some major tweaking has gone on underneath. We'll show you what's possible in the new Communicator, which should be available for free download by the time you read this, and address whether it's worth an upgrade.

Jim Mitchell

Smart Browsing

Internet addresses, or **universal resource locators (URLs)**, have always been complicated, even though most of us have adjusted. To the end user, most of the "http"s and "com"s are extraneous and serve to make Web wanderings awkward. Browser designers are finally understanding this point and making changes that serve the end user. The dropping of the "http://" in front of Web addresses was a step in the right direction in the 3.0 versions of both *Netscape Navigator* and *Microsoft Internet Explorer*.

Further advancements in the 4.0 versions made it easier. Many times, you wouldn't even have to enter the "www" or the ".com"—the browser would assume these should be in there. For example, typing "smartcomputing" would take you to "http://www.smartcomputing.com." But, because many URLs don't use "www" and "com," the browsers tended to become confused. If the address was for a page farther down the site, such as "http://www.smartcomputing.com/Editorial/feature.htm," you could forget about finding it easily.

Communicator 4.5 takes the next step in this streamlining of Web address searching. The Smart Browsing feature ties the browser directly to the Netcenter information site so it can use Netcenter's database of Web sites when a user is searching for a specific site. Smart Browsing goes beyond just tacking on a "www" and a "com" and finds the right site on the database. You can type a single word or several, and it will try to find the corresponding site. For example, if you type "Music Boulevard," it will bring up the site you're looking for: "http://www.musicblvd.com."

Internet Keywords. You even can find a specific page at a site by using what Netscape calls Internet Keywords to describe your query. For example, if you type "Ford Ranger" in the text field, up comes the page: "http://www.fordvehicles.com/ranger." And since it's all part of Netcenter's online database, the addresses can be automatically changed at Netcenter, and you don't have to worry about finding the new URL. Netcenter's database is constantly growing to include more sites.

What's Related? The What's Related aspect of Smart Browsing gives you easy links (again from the Netcenter database) to sites with auxiliary information. Just click the What's Related button next to the Web address field to access a pop-up menu of these links. While reading about the Ford Ranger, for example, we found links to Netscape's own truck site, country music sites, and a mysterious page detailing the life history of a person named Rob English. Netscape says that over time, the What's Related feature will grow larger and smarter with its collection of links. (Sorry, Rob English.)

NetWatch. The new Communicator is also trained for safe browsing. After you choose the types of sites that you deem appropriate for you and your family to view, the NetWatch

feature will filter through the sites that Communicator visits and disallow sites that contain unsuitable content.

Netscape Messenger

Communicator 4.5 unveils a reworking of *Messenger*, Netscape's E-mail and newsgroup program, or **client**. (Netscape's previous news client, *Collabra*, has been incorporated into Messenger.) Many of the changes are minor, but there have been some serious appearance modifications. Messenger now features a three-pane interface with mail or news folders to the left, messages to the top-right corner, and the highlighted message in the bottom-right. This matches the excellent look of *Outlook Express* (Internet Explorer's mail client and newsreader).

The 1998 Ranger
Weekends and Ford Rangers were made for each other.
That's when you're free to go wherever you want.
Free to do whatever you want. Ranger is new for 1998. With a sporty style. With comfort and convenience enhancements. And improved hardware that lets it play harder than ever.

Clicking the new *Communicator's* What's Related button brings up a list of sites (mostly) relevant to the one you're viewing.

Netscape also overhauled the address book, featuring a two-pane interface that incorporates directories and mailing lists into your personal address book contact list. In addition, Messenger will now automatically find the correct address in the Compose window (instead of you having to bring up the address book).

Other improvements include built-in message templates, better search and filter options, and automatic downloading of new E-mail or newsgroup messages.

Roaming Access

Netscape realizes that not all of us use just one PC to access the 'Net. Mobile users have laptop or even handheld PCs for their on-the-road Web connections, and many Internet users have accounts at work and at home. So Communicator 4.5 lets users store their application environment on a central **server** (a computer providing information to a network) so they can use it from the PC of their choice.

This means that no matter where you're connecting to the Web—from your desk, your coworker's desk, your portable PC, or at home—the browser knows you and has access to personalized settings from bookmarks for your favorite Web pages to E-mail messages.

Communicator 5.0

So who should think about upgrading to Communicator 4.5 when it's available for a final release? The answer is anybody who could take advantage of the new features we've described. The final release should be available from Netscape's site at http://home.netscape.com. It's a big chunk of a download (more than 13 megabytes) for users who access the 'Net through a dial-up connection with a modem, but it's worth it for the new browsing capabilities.

Also keep your eye out for the Communicator 5.0 beta which should be out by the end of the year with a final version due out early next year. The 5.0 version will contain all the improvements of the 4.5 version and more. Its source code has been available free to developers since early this year, so we should be seeing a lot of new and even more attractive features. ■

by Joel Strauch

Internet Explorer: The Next Generation

Never one to be outdone, Microsoft is currently working on its next browser version, *Internet Explorer 5.0*. The program is currently available only in a rather unstable Web developer preview, but an end-user **beta** (trial) version should be out before the end of 1998 and a final version sometime (hopefully, early) next year.

Microsoft breaks the new attributes of the 5.0 browser into three categories: fast page rendering and data processing, a platform for enterprise-enabled applications, and extensibility and componentization. Here is what all this Microspeak means: Fast page rendering and data processing translates into quicker Web viewing. Better use of the browser cache, more efficient table presentation, and other basic performance improvements promise to move you around the 'Net at a faster clip.

Because it is a "platform for enterprise-enabled applications," it will be easier for users to write and design Web pages for Explorer 5.0. Although this doesn't affect the end user as much as Web designers, users will notice the effects when they're able to perform more advanced operations in the browser, such as dragging and dropping items to and from Web pages and using content that is personalized to your browser and its settings (such as having features written in the Java programming language turned on or off).

Finally, its extensibility and componentization simply mean that Explorer 5.0 will be able to handle a wider variety of 'Net scripts and plug-ins. A useful aspect for the consumer is Explorer 5.0's ability to recognize whether you have any applications, such as *Quicken* or *America Online*, that are tied to your browser and automatically update them to Explorer 5.0 when it is installed. ■

Make Sense Of The "ML" Family

Meet The Lineup Of Web Programming Languages

Jim Reckling

As an average World Wide Web user, you're probably familiar with the **Hypertext Markup Language** (**HTML**). This programming language of the Web is fairly simple to understand, with its system of on/off tags that tell a Web browser how to display text, images, or other page elements. It's more difficult to grasp just how many similar "- -ML" languages are in use on the Web.

Despite your suspicions, it's not a conspiracy to confuse. Web languages are rigorously defined by professionals, and a little study lets you understand the most influential Web languages. In general, a **markup language** is a system for structuring and formatting document elements. All markup languages use a system of tags that designate text elements such as paragraphs, bold text, or images. The more specific the language, the more specific the tags.

Many of the languages we'll discuss are authorized by the **World Wide Web Consortium** (**W3C**), a multinational organization that decides how Web languages would be best implemented. The W3C ultimately presents an official specification for languages it promotes, covering rules for the language, which Web developers follow.

SGML-Standard Generalized Markup Language

Before any Web languages were conceived, there was **Standard Generalized Markup Language** (**SGML**). This granddaddy of written electronic communication was developed by the International Standards Organization (ISO) in 1986 as a way for different types of industrial computers and operating systems to understand text and document structure.

SGML is not really a language but rather a set of rules for creating new languages that describe types of texts electronically. Each new language has its own **document type definition** (**DTD**). Each DTD has its set of tags and attributes and exists as a formal document.

For instance, HTML is created from SGML elements and has its own DTD. Generally, SGML is the parent language of much electronic communication, and SGML's offspring languages can be as different as English and Hindi, both which have roots in the parent language of Indo-European. What SGML-derived languages have in common is a set of rules for defining the structure and look of a document, often seen in the form of on/off tags. These tags are the "markup" used in our HTML documents.

HTML-Hypertext Markup Language

HTML is, by far, the best-known derivation of SGML. It's the set of codes we use to create Web pages, codes that—for the most part—can be read by a browser on any desktop computer and any operating system. The codes let us build documents with definable headings, paragraphs, links, and other components.

Here's a sample of a page written in HTML markup:.

```
<H1>Moby Dick</H1>
<I>by Herman Melville</I>
<P>Call me Ishmael.
```

If a Web browser were to parse and present the above text, it would display the title of this famous literary work as a large headline (as indicated by the <H1> tag) and present the author's name in italics (as indicated by the <I> tag). The <P> tag directs the browser to begin its display of the novel with a new paragraph.

Although HTML has been in use since 1990, the first formal HTML specification was published by the W3C in 1995 and included the core HTML tags as we know them today.

Subsequent versions of HTML allow for more complex Web documents. HTML 4.0 is the W3C's latest recommendation for Web authoring. This specification includes support for international languages, **programming scripts** (blocks of code that make pages more intelligent), **style sheets** (which make it easier to control page formatting), **frames** (a display like multiple browser windows on one screen), Web forms, and more intricate tables.

Some Web designers find HTML 4.0 restrictive. For instance, it's impossible to render many mathematical symbols in HTML, and HTML doesn't have strict enough rules to exchange specific business documents over the Web.

XML-Extensible Markup Language

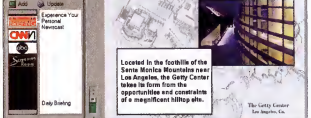
Because Internet technology and uses for the Web are improving and expanding, HTML 4.0 is probably the last version of HTML the W3C will recommend. To effect a shift to modular languages, standards organizations took the long view and developed a new set of rules for creating Web markup languages, a pared-down version of SGML called the **Extensible Markup Language** (**XML**).

Just as SGML spawned HTML, XML will beget its own brood of languages. It's a logical way for Web users to start developing their own languages to suit specific needs without having to learn SGML. XML, recommended by the W3C in February 1998, is not yet a mainstream development tool. We may see XML applications integrated with HTML 4.0 and used widely across the Web, or we may see them primarily as niche languages, used by specialized hardware and software. We will probably see both.

An XML language can describe anything. For example, a multimedia group could create tags for describing action, such as <BARKING>Dog</BARKING>. An industry standards group could develop tags for ranking or individuating, such as <POMERANIAN>Dog</POMERANIAN>.

It's hoped that future browsers will parse a new crowd of document types, not just HTML.

Over the next several years, Web watchers will see a slew of new XML languages invented to transfer specialized content over the Web including multimedia objects, financial information, part numbers, mathematical notations, document ratings, and scholarly documents. Because new XML languages can be so specific, it will easier to search through them.


Channels
Add
Update
Experience Your Personal Newscast
CNN
Daily Briefing
Located in the foothills of the Santa Monica Mountains near Los Angeles, the Getty Center takes its form from the opportunities and constraints of a magnificent hilltop site.
The Getty Center Los Angeles, Ca.

The SMIL specification incorporates streaming audio and video and hyperlinks for viewing on the Web.

Finding Supporters. It remains to be seen which browsers will support which new DTDs. Obviously, popular Web browser support is crucial for any new language. Many developers will work closely with browser companies Microsoft and Netscape to ensure their support. Others will try to develop their own browser, or "viewer" software, that will understand their languages' DTDs. Still others will rely on browser plug-in programs to parse their language.

But corralling browser support is only one problem developers face. There are more global roadblocks to widespread XML adoption, such as incompatible style sheet standards, uncertain hyperlinking technology, and as-yet-undefined federal government standards. Such obstacles are increased by the sheer laboriousness of developing a new XML language.

As yet there's no imperative for casual Web authors to learn XML, much less develop languages of their own. Instead, ordinary surfers can sit back and watch as industries and interest groups develop XML-based languages for creating documents that will make Internet commerce and communication easier for their members.

Internet professionals should keep their eyes open, especially when planning future Web development. Over the next several years new XML-based standards will appear, and not all will be widely adopted. Web managers will want to stick to well-supported standards and be cautious about implementing new and unproven Web technology.

Anyone interested in learning about XML and its developments should start at the W3C's XML Web (http://www.w3.org/XML) and the XML FAQ from the W3C's Special Interest Group (http://www.ucc.ie/xml).

SMIL-Synchronized Multimedia Integration Language

Also recommended by the W3C, **Synchronized Multimedia Integration Language** (**SMIL**, pronounced "smile") lets Web authors control the look of multimedia elements on a page. This subset of XML is used to position and set the timing of audio, video, and animations, as well as images and text.

Of course, to see elements described in the SMIL structure, you'll need a browser that can understand it. Currently several products are under development for creating and viewing SMIL pages. Find the most current information at the Just SMIL site (http://www.justsmil.com) or at W3C (http://www.w3.org/AudioVideo).

DHTML-Dynamic HTML

XML holds much promise, but don't expect HTML to die out soon. New HTML extensions called **Dynamic HTML** (**DHTML**) are a popular way for Web authors to make Web pages more active. DHTML is a generic buzzword that refers to documents that combine HTML, programming scripts, and style sheets. Documents with DHTML components can update themselves depending on where the reader is located, what time it is, or what other Web pages the reader has recently visited.

DHTML pages come in many forms, but they usually contain moving parts and are typically very sensitive to where users point the mouse. Users often can drag and drop objects and interact with the Web site in various ways, like interacting with software. DHTML pages also can contain and download fonts; use graphics in layers; and, with style sheets, give Web designers precise control over page layout. Some might argue that any Web page that contains a JavaScript is a DHTML page. But it's really a matter of degree, and true DHTML will take advantage of the **Document Object Model** (**DOM**).

Integral to DHTML, the DOM is a W3C specification that describes how Web objects should be represented and how they can be controlled by scripts. The DOM is an interface with a standard set of objects for use in HTML and XML documents. Furthermore, DHTML doesn't require requests to a Web server to execute the scripts, which makes for speedy interactivity.

To experience DHTML pages, you must use version 4.0 of either *Netscape Navigator* or *Microsoft Internet Explorer*.

Creating DHTML pages is not as simple as coding in HTML. It requires a basic understanding of programming languages; knowing JavaScript or Visual BASIC will come in handy. Although writing code is not required to do DHTML (the modular scripts can be reused, and new programs even generate scripts automatically) Web authors should understand how to plug in and activate DHTML scripts.

Cutting-edge coders should read the DHTML documents at the Web sites of the W3C (http://www.w3.org/DOM), Netscape (http://developer.netscape.com/tech/dynhtml/index.html), and Microsoft (http://www.microsoft.com/workshop/author/contents.htm).

This SuperFly site at http://www.dhtmlzone.com/tutorials/index.html lets you learn DHTML while playing with "paper dolls."

SHTML-Server-side HTML

Cool is cool, but DHTML isn't the only tool for way interactive Web pages. **Server-side HTML** (**SHTML**) refers to a kind of comment included in a Web page that directs its Web server to generate data on request. The request is called a **Server-Side Include** (**SSI**). It could be as simple as directing the page to insert boilerplate text and graphics from another file or as complex as executing a database program and inserting the results in a new page. With SSI you can, for example, display the current date or time, employ a page counter, or generate random quotations.

You don't have to be a programmer to use SSIs. On the other hand, you must understand some technical details about your Web server and be comfortable uploading files to it. Also, because using SSIs may involve copying small programs to the server, Webmasters consider them security risks and "resource hogs" that slow down the server. Talk with your Internet service provider (or any other party that provides your server) before tinkering with this technology.

An excellent source of information on SSI is the National Center for Supercomputing Applications at the University of Illinois (http://hoohoo.ncsa.uiuc.edu/docs/tutorials/includes.html).

VRML-Virtual Reality Modeling Language

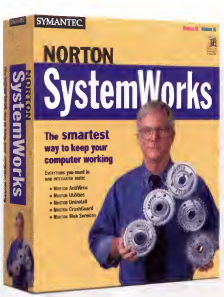
A gamer's delight, the **Virtual Reality Modeling Language** (**VRML**, pronounced "vermal") is HTML in the third dimension. With a file written in VRML and a VRML-compatible browser, you can use your keyboard to navigate and interact in three-dimensional (3-D) worlds. To view VRML on the Web, you can download a special browser or update your current one with a plug-in.

To learn about VRML, we recommend starting at the VRML Works Web site at http://home.hiwaay.net/~crispen/vrmlworks.

Other specific languages include the **Mathematical Markup Language** (**MathML**), which is designed for describing mathematical notations on the Web, and the **TV Program Making Language** (**TVML**), which synthesizes familiar TV elements such as titles, moving and speaking characters, lighting and camera angles, and narration and background audio.

By now you've seen the method to the Web language madness. Decide for yourself whether you need to learn more or just keep your Web browser up to date. Then keep working on the mystery of the "ml" languages. ■

by Marti LaChance



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Compiled by Jeff Dodd & Joel Strauch

Reference Resources

Dave Hale

Acronym Finder
http://www.mtnds.com/af

For those still baffled by the meaning of acronyms such as "FICA" and "ASVAB," the Acronym Finder is a gold mine. This searchable tool features more than 55,000 acronyms for every occasion, but focuses primarily on those of the computer, technology, telecommunications, and military variety.

megaConverter
http://www.megaconverter.com

The megaConverter is a one-stop shop for calculating weight and measurement conversions. Conversion modules cover all the standard (area, force, length, mass and weight, temperature, and volume) and technical (astronomical distances; decimal, hexadecimal, octal, and binary numbers; energy; and power) measurement conversions. The megaConverter also includes a number of non-traditional but very practical modules for determining the heat index, wind chill, finance interest, metric prefixes, and monthly payments.

The Elements of Style by William Strunk, Jr.
http://www.columbia.edu/acis/bartleby/strunk

Who or whom? Affect or effect? Should you add a comma before the final noun in a series? Confused writers can find the answers in "The Elements of Style," considered by many to be the definitive guide of written English. The text, written more than 60 years ago, includes some dated examples, but the information is sound and will help you produce an effective written presentation.

Encyclopedia.com
http://www.encyclopedia.com

This online encyclopedia offers more than 17,000 articles on everything from Aachen (a German city) to zydeco (an American musical form). Users can search or browse for a topic, and each entry is supplemented with hyperlinks to related entries. The entries also include links to BarnesandNoble.com for a list of related books, links to related Internet sites, and links to the Electric Library, a premium online information service.

The Getty Thesaurus of Geographic Names
http://www.gii.getty.edu/tgn_browser

This searchable index offers "place records" for more than 900,000 locations worldwide. For example, if you enter "Bujumbura," the Thesaurus reports that it's a city located in the nation of Burundi on the continent of Africa with a latitude of 3 degrees 22 minutes south and a longitude of 29 degrees 19 minutes east, with industries specializing in textiles, paper, and agricultural products.

Magellan Maps
http://pathfinder.com/travel/maps

Magellan Maps provides overview maps of every politically or geographically recognized region on earth. Visitors to this site also can place orders for hard-copy maps, atlases, and travel gear.

National Address and ZIP+4 Browser
http://www.semaphorecorp.com/cgi/form.html

Impress your colleagues by including the full ZIP+4 code on the letters and packages you send their way. Enter the intended recipient's company name or street address as well as the city and state, then wait for this site to return the full ZIP+4 code. You also can view a record of surrounding buildings that share the code.

OneLook Dictionaries
http://www.onelook.com

Unless you have a personal copy of the Oxford English Dictionary, you've probably found yourself thumbing through multiple dictionaries to find an elusive term. Those days are over with the OneLook Dictionary, which searches 301 dictionaries to find a corresponding definition. The site also features the Best Price book finder, which locates the lowest price for practically every book available online.

Virtual Perpetual Calendar
http://www.mnsinc.com/utopia/Calendar/Virtual_Calendars.html

We're stuck with a calendar that requires us to throw in an extra day every fourth year, but The Virtual Perpetual Calendar offers some relief. The site's most useful feature is the collection of calendars for the 19th, 20th, and 21st centuries, which show the day of the week that corresponds to any day during these 300 years.

Old Farmers Almanac
http://www.almanac.com

"The Old Farmers Almanac," a trusted source of general information since 1792, has gone high-tech. Now you can point and click your way through weather reports, gardening advice, cooking tips, ol' fashioned wisdom, and all the rest of the tidbits of information that have made this book an American tradition.

Quick Fixes

Most of today's software can benefit from a few updates, patches, and add-ons downloaded from the Internet. These sites will help you stay on top of the latest updates.

This month we focus on your printer device drivers. Keeping these programs that let your PC communicate with your printer running smoothly can determine whether you get that report out on time.

Hewlett-Packard

HP, the world's largest printer manufacturer, has an efficient and usable download support site. When you choose your printer's make and model, you can access the latest driver. In addition, there are how-to instructions, service information, troubleshooting guides, and more for your specific device.
http://www.hp.com/cposupport/jsnav/prhome.html

Canon

Agree to the opening disclaimer and you're granted access to Canon's software download page. Choose your printer model from any of the drop-down menus to receive a list of available software for your peripheral.
http://www.ccsi.canon.com/care/downloads/disclaimer-1.html

NEC

NEC has a plain but efficient page with a large list of all the printers that it manufactures. The driver files for each are accessible by hyperlink.
http://cssweb.nectech.com/customersupport/drivers/printers.htm

Try It Online

The World Wide Web is about more than just data; it offers a chance to get involved and interact online. Check here for sites that let you get the most from the Web.

dMarie Time Capsule

http://www.dmarie.com/asp/history.asp

Remember that time capsule your second grade class filled with newspaper headlines, favorite music, and invaluable knickknacks? Ever wish you could get a peek inside? Well, you can't, but at the dMarie Time Capsule you can glimpse into any era you might have trouble recalling. Enter a date (month, day, and year) to see the period's prevalent headlines, chart-topping music, retail prices, Academy Award winners, and birthdays.

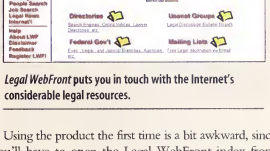
For example, on June 21, 1950, a loaf of bread cost roughly 14 cents and Nat King Cole's "Mona Lisa" was a top song. Recent headlines featured news about a threatened railroad strike that prompted President Truman to order the Army to control the railways and Althea Gibson becoming the first black woman to play professional tennis.

Share The Wares

Some of the best apples in the online orchard are the free (or free to try) programs available for download. Each month we feature highlights from our pickings.

Legal WebFront

Perform legal research on the Internet the easy way with *Legal WebFront* shareware from 2SCAN Internet Consultants, Ltd. The software will function with any browser and contains links to hundreds of the most useful legal research Web sites. After you download the executable file from http://www.twoscan.com, double-clicking it will unzip all the compressed files into a folder for Legal WebFront.



***Legal WebFront* puts you in touch with the Internet's considerable legal resources.**

Using the product the first time is a bit awkward, since you'll have to open the Legal WebFront index from within your browser. But for someone in the law business looking for the Web's best legal information, this shareware is definitely worth looking into. It has links to mailing lists, newsgroups, and various online directories to help you through your day in court. After a free 30-day trial, you must pay the $34.95 registration fee.

Lesson Planner Plus

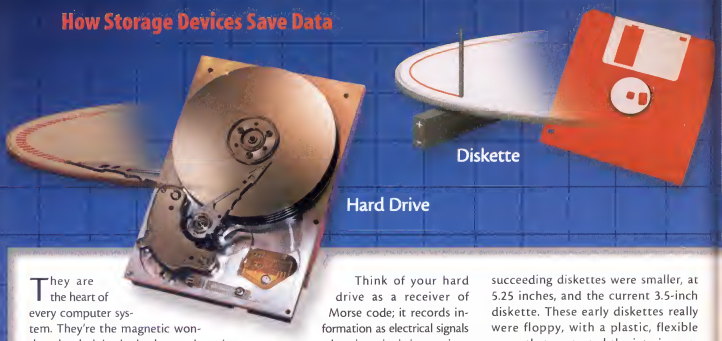
Whether you're a teacher or a businessperson who needs help organizing a boardroom presentation, *Lesson Planner Plus* from Dennis Baggott and Sons can be the drawing board you've been looking for. The shareware is available at http://www.dbandsons.com.

Lesson Planner Plus is a quick, easy way to create lesson plans for printing in seven different styles. The shareware version will function fully for 30 days at which time you must pay $25 for registration. ❚❚

Compiled by Buffy Cranford-Petelle
Graphics & Design by Lori Garris
& Fred Schneider

Stockpiling Information

How Storage Devices Save Data



They are the heart of every computer system. They're the magnetic wonders that lurk in the background, storing information. But even with their impressive capacities, hard drives fill up fast. That's why many users buy other storage devices. That much is easy to understand, but comprehending the technology in these storage devices is more challenging. The following descriptions explain how popular storage devices save information.

Hard Drive

Hard drives store information as binary numbers (0s and 1s). The data is stored as you press keys on the keyboard, or utilize your mouse, by responding to your commands and moving on various areas of the platter. These platters have a magnetic material covering them. An electrical current flows through a coil on the read/write head to produce a pattern of data. The binary numbers are actually electronic signals.

Think of your hard drive as a receiver of Morse code; it records information as electrical signals and retrieves it via instructions from your keyboard or mouse. The term "hard" is used because the inner disks in the drive that store the data are composed of tough aluminum alloy.

You can compare your hard drive to the phonograph records that recorded sound in concentric circles. The hard drive's aluminum-alloy platters are constantly spinning, and they record data in circles, or tracks, from the outermost edge of the disk inward. The hard drive is the fastest storage device available because the platters spin at 3,600 revolutions per minute (rpm) or more. Just as in a record, the hard drive can store information on both sides of the platter, but you don't have to flip it over to access different data.

Diskette

The earliest diskettes were 8 inches wide, but as technology improved, the succeeding diskettes were smaller, at 5.25 inches, and the current 3.5-inch diskette. These early diskettes really were floppy, with a plastic, flexible cover that protected the interior, unlike today's diskettes encased in a firm plastic case.

The diskette spins at 300 rotations per minute (rpm), and is composed of a circle of magnetic material that is recordable on both sides. The diskette drive spins the inside of the diskette and senses and records the data from the diskette through a read/write head that discharges electrical impulses that record bits in negative or positive polarity.

Zip Disk

Iomega Zip drives are available as external or internal devices, and the disks are designed to be portable. The Zip disk is in a hard plastic case, and like the diskette, uses a magnetic material for double-sided recording and reading. Zip drives are a larger medium and their read/write heads can simply

operate more efficiently than those on a regular diskette drive.

Tape Storage

Tape drives function like a VCR, with the tape drive winding the tape from a cartridge to locate data. Tape drives read information through the tape spools, and write data on the tape through sequential encoding. Tape drives are composed of a magnetic tape, and its capacity is measured in bits per inch. Information is recorded on parallel tracks that are located on the entire length of the tape. They are available in cassettes, cartridges, reels, and various shapes and sizes.

Tape drives magnetically store data on tape cartridges instead of platters. That means when the drive wants to access data on the tape cartridge, it has to roll through the tape until it is at the right location, similar to an audio-tape cassette. Magnetic disks can hop directly to the location of the information, similar to the arm on a record player.

CD-RW

Read-only memory, compact discs (CD-ROMs) are as common as the diskette. They are available in Recordable (CD-R) and Rewriteable (CD-RW) form. CD-RWs are a form of optical media, so they write and read media via lasers, which create pits, or holes, of data on the disc's surface. These holes form patterns that the disc encodes, and the CD player or drive retrieves. Because the pits are physical marks rather than magnetic states, CDs can't be harmed by magnetic fields. Whereas your favorite Celine Dion CD is crafted from a mold, the construction of CD-Rs and CD-RWs are with a laser. CD-Rs Write Once, Read Multiple (WORM), letting you copy a disc full of data once, and then read it multiple times. CD-RWs allow for writing, reading, and rewriting of information multiple times. These discs, unlike tape cartridges, can randomly access information in any order. Your computer can read either a CD-R or CD-RW, but you will need a CD-R Recorder/ Rewriter drive to record data.

Digital Video Disc (DVD)

The Digital Video Disc (DVD) was introduced for home entertainment to deliver a higher quality picture and sound than typical VHS tapes, but with the demand for additional storage space in the computer industry, the technology of the DVD is catching on in the PC realm. DVDs are offered as a recordable disc (DVD-R), and a multitude of rewriteable disks: DVD+RW, DVD-RAM, DVD-R/W, and MMVF. DVDs are recorded similarly to CDs, except their "pit" layers are more compact, providing a higher storage capacity, and they can be read only with a DVD player. Although DVD is still struggling to join the mainstream of the computer industry, there are drives and accessories available. ■

Need help with your hardware or software? Looking for simple explanations of technical subjects? Send us your questions!

Windows NT:

Q: ***My system is set up to alternately boot with Windows NT Workstation or Windows 95b. I have a two gigabyte (GB) hard drive with part of it set up for NT and part of it for Windows 95 (Win95). I need to uninstall NT 4.0 so I can repartition its portion of the drive. I'm using the NTFS filing system for NT and FAT32 (File Allocation Table 32) for the Win95 partition. How can I get the NT partition to show up when I use the FDISK utility?***

A: The optional NTFS (NT File System) way of partitioning a hard drive differs from both the older DOS FAT16 method and the newer Win95/98 FAT32 method. Although FDISK's purpose is to add and remove **partitions** (sections of a hard drive that act independently and have different letters), no version of FDISK (not even the newest one with Win98) can "see" or delete an NTFS partition. If you had set up Windows NT (WinNT)and Win95 with FAT16 filing systems, you wouldn't be in this corner. (*NOTE: Those contemplating running WinNT 5.0 and Win98 on one system can avoid FAT system incompatibilities such as this by setting them up on FAT32.*)

Removing partitions is serious. In case you accidentally kill the wrong partition or make it unbootable, we suggest you back up the Win95 partition before you start. You'll need your three NT Setup diskettes. Put the first diskette in the drive and start the PC; that'll automatically get you into NT's installation procedure. Near the beginning, NT's own partition manager pops up; when it does, select the option for removing partitions. Then, press F3 to exit from the NT installation. Remove the diskette and reboot. Now Win95's FDISK will see the leftover space where the NTFS partition used to be, and you can use it to create FAT16 or FAT32 partitions. If you don't have the setup diskettes but do have the WinNT CD-ROM you can use that to make a new set of startup diskettes. Put the CD-ROM in your drive. Open a DOS window (either in Win95 or NT) and type **e:** (if E: is your CD-ROM drive's letter) and press ENTER, then type **cd \i386** and press ENTER to get into the I386 folder. Once there type **winnt /ox** to force it to make new setup diskettes.

"I need to ***uninstall NT 4.0*** *so I can repartition its portion of the drive."*

Another option, particularly if you've lost your diskettes and/or can't access your CD-ROM, is to get a third-party partitioning tool such as *PartitionMagic* or *Partition-It*. These work on virtually all partition types, including NTFS partitions, and they'll let you adjust partitions' sizes far more easily, without removing software installed on the drive.

Windows 95:

Q: ***Can you explain the purpose of three strange files in my \DOS folder? They are DEFRAG.EX~ , DBLSPACE.EX~ , and SCANDISK.EX~.***

A: The presence of these files (and a \DOS folder) tells us your Win95 operating system was installed onto a system that previously had MS-DOS. Win95 found certain DOS utility program files it planned to update. (The older versions are dangerous to run on the newly converted Win95 system.) These files had the names you mention, but ended with the .EXE file extension. So after putting the newer versions in your WINDOWS\COMMAND folder, Win95, rather than deleting the old ones, renamed them by changing the last character to ~, which makes them unable to run. It's safe to delete them.

Q: ***My computer came from the office to my house, and now that it's on my two-computer home network it still appears to my wife's computer to have the name of the person who used it in the office. The Workgroup appears as Accounting, instead of just Workgroup, which is how hers appears to me. How can I change these without reinstalling Win95?***

A: Normally the Computer name and Workgroup name, which are what your wife's computer sees, are set in Control Panel, under the Network icon. If you double-click the Network Icon a dialog box should open; click the Identification tab. There you can change the Computer name and the Workgroup (or

Domain) name. This is done the same way in Win98 and NT, too.

Utilities:

Q: ***I tried your August Q&A suggestion about using the free utility COA32 to change my CD-ROM drive letter from D: to X:. But it still shows as D:, and some of my programs don't run now. What's wrong?***

A: *NOTE: It's best to back up your system before tinkering with a program like this one; that way if something goes wrong you need only restore from backup, rather than wait for an answer from us or tech support.*

When we get questions about a program not working, particularly with freeware, we normally recommend that you contact the program's maker. In this case, however, we can help. Our earlier article said setting your CD-ROM drive to a high letter is a great idea. But you misunderstood both what we and COA32's maker were claiming COA (Change of Address) does. It isn't for changing the letter identity of a drive. It's for use after you change the letter of, say, a CD-ROM drive yourself (or it's happened accidentally). Usually after you change your CD-ROM drive from, say, D: to X: all sorts of problems occur because things expected to be on D: are no longer there.

COA32 is designed to go into your system after the change and, used properly, advise (reconfigure) all software so programs that used to look on D: know to look on X: instead. We'd expect problems in your case because you didn't actually change your CD-ROM drive's letter from D: to X:, but you did make COA32 tell all your programs (and Windows) that you had. If you tell such lies to your system it'll malfunction.

To manually change your CD-ROM's drive letter do this: If you find a line in your Config.sys file that looks like DEVICE=C:\Cdsetup.sys, you can try modifying the line by putting /t:x on the end, then rebooting (restarting) the PC.

Regardless of whether you have such a line in Config.sys, you can change the CD-ROM drive setting in Windows with the following steps: Open Control Panel, either by double-clicking My Computer (on the Desktop) or by clicking Start, Settings, Control Panel. Double-click the System icon, then Device Manager and CD-ROM. A secondary branch should pop out, showing your brand of CD-ROM drive. Double-click it, then click the Settings tab. Go down to where it says Start drive letter and change that to X. If there's also a box for End drive letter change that to X, too. Click OK.

Computer Hardware:

Q: ***My dental practice's five-computer Win95 peer-to-peer network is only four years old, but it's running on 486s with eight megabytes (MB) of random-access memory (RAM) each, with ordinary 10Base-T network adapter cards. The network is reliable, and I don't care about being state of the art for its own sake, but our searches for patient records are starting to slow down. The vendor says it slowed down because our patient database has grown and we need to upgrade to Pentium computers and install a WinNT server to obtain the speed we want. Are there any other alternatives?***

A: Usually we can't answer questions such as this without more detail or a visit to your site, but in this case there are worthwhile alternatives. Often what limits network performance isn't primarily the PCs themselves but the speed at which information moves over the network wiring; that depends on your network cards and adapters. Replacing your older 10 megabit per second (Mbps) network cards with newer 100Mbps card ($40 to $75) should speed you up more than new computers. Also consider shoving more RAM into each computer, especially the one in which your dental management software keeps its data. Spending about $30 per computer will bring each up to 32MB of RAM, which should produce noticeable performance boosts.

"Often what limits ***network performance*** *isn't the PCs, but the speed at which information moves over the network."*

Finally, if you haven't been regularly defragmenting the hard drive on the computer holding the main patient data, try doing it once a week. These three steps should provide a system that'll carry you for at least a few more years with satisfactory performance at far less cost than a major replacement. One other advantage is that with the modest changes we suggest, you're far less likely to run into the unexpected break-in bugs, delays, and headaches that too often arrive with a total hardware upgrade.

Q: ***When my 120 megahertz (MHz) Pentium system starts up it displays an "Invalid system disk" message. This confuses me because there's no disk in there. When I put my Win95 Startup diskette in its drive and try to restart,***

I don't get the message, but when I type c: and win it doesn't start Windows. What am I doing wrong?

A: The "Invalid system disk" message refers to your hard drive (C:), not your empty diskette drive. When most PCs start up they first look for a working "system," bootable drive in A: (the diskette drive). If there's none there they try looking on the hard drive for a working "system" C: drive. If that fails they give you that message. If there's a diskette in A: when the system looks there and it has no working operating system you'd receive a "Non-system disk" message. But when the Win95 Startup diskette is there the computer is content and boots to a primitive DOS prompt operating off the diskette drive.

"You're unlikely to max out a surge supressor, even if you plug all your computer toys into it."

Once at the A: prompt, if you type **c:** and press ENTER, you'll see a C: prompt if your C: drive isn't completely dead in the water. (NOTE: The Win-98 Startup diskette situation is different; don't use these steps for Win98.) If the hard drive is totally inaccessible (probably drive or controller failure) you will receive a message saying "Invalid drive specification." You apparently got past this point. If the only thing wrong with your C: drive was that it wasn't booting and was otherwise intact, you might have had a chance at starting Windows if you'd typed **cd windows** (to move into the Windows folder) before typing **win**. But even if it worked you'd probably find that starting it in that unorthodox way would produce some peculiar or nonfunctional results.

Basically the "Invalid system disk" message means your hard drive is dead or the basic files/tracks it needs for booting are corrupt. If your Win95 Startup diskette has a file called Sys.com, you might be able to make your C: drive bootable again by typing **sys c:** and then pressing ENTER at your Startup diskette's A: prompt. If it doesn't have Sys.com, you might be able to get it with this command: **copy c:\windows\command\sys.com a:**. If all else fails, you may have to reinstall Win95 from scratch. If a reinstall works and the problem recurs, it could mean your hard drive is going bad.

Q: ***I have a cheap surge suppressor, an expensive surge suppressor, and a master control box that plugs into a power plug and has switches and plugs to separately control my monitor, printer, and computer. Should I plug the master control box into the wall and then plug the better surge suppressor into the control box, or should I plug the surge suppressor into the wall, the control box into that suppressor, and then put the cheap suppressor between the control box and the computer?***

A: First, while it's generally true that more expensive surge suppressors perform better (particularly if there's a large price difference) that's not an absolute rule; you'll have to read the specs to rank them by quality.

You can play this several ways. Here are some guiding principles: Make sure the sum of the power consumption of the total amount of equipment plugged into any surge suppressor, **power conditioner** (a device that sustains normal voltage to a PC over long periods of time), or control box doesn't exceed the unit's power rating. Most computers and other electrical devices list their maximum power draw ratings on a plate on the back in either watts or the almost-equivalent units called volt-amps. The surge suppressor, battery backups, and power conditioners also carry plates listing the power they can produce. Sometimes input and output power limits are rated in amps. If so, just multiply the amps by 120 (if using North American electricity) to obtain the approximate wattage. Most surge suppressors can handle up to around 1,800 watts. Most computers draw about 250 watts, monitors draw about 250, and newer printers draw about 100. So you're unlikely to max out a surge suppressor even if you plug all your computer toys into it.

That's not the case with low-priced battery backups (sometimes called uninterruptible power supplies, or UPSes), which sometimes have as little as 250 watts capacity—forcing you to decide which items to keep running if the power goes out. If you stay in the bounds of each box's power limits you can plug in surge suppressors, power conditioners, control boxes, and UPSes in any order. You even can plug two cheap surge suppressors in line one after the other to increase protection. In your case we'd suggest plugging the good suppressor into the wall, plugging the control box into it (thus protecting the control box and everything it controls), and plugging the cheap surge suppressor between the control box and the computer (doubling the computer's protection.)

Online Communications:

Q: ***Even when I know an exact universal resource locator (URL, World Wide Web address) I want to visit, if my browser isn't open yet, I'm forced to go to my browser's***

home (start) page and wait for the page to load before I can enter the Web address I want and finally reach that page. Isn't there any more direct route?

A: If you're running Win95/98 or WinNT the quickest option is to click Start, Run and enter the URL and press the OK button. You even can do this if your browser is already open and running. If you're still running a Windows 3.1 browser you probably can't use the "run" trick, but you can click the Stop button as soon as the browser starts opening on most browsers to make the normal home page stop loading. Then type the URL you want to visit into the browser's address bar.

Word Processing:

Q: ***My word processor works fine for letters, but with projects requiring careful text alignment, such as brochures or business cards, it sometimes loses its ability to accurately show on-screen the positions in which lines will actually print. Is this a limitation of my particular word processor? Do I have to obtain a page layout program such as PageMaker to do this kind of work?***

A: We concealed the brand of the word processor because we receive many questions such as this about many brands of word processors. An absolutely perfect correspondence between what you see on-screen and what you get on the printer (What You See Is What You Get, or WYSIWYG) isn't always possible. Some factors that affect the match include the screen's resolution, the printer model, the printer's resolution, and the printer device driver. Despite these variables it should be possible to position on-screen items more than close enough for small runs of business cards and brochures in most word processors.

Here are a few traps to avoid when trying to align text material and get a good match between what is on your screen and what comes out your printer:

- Avoid using the Spacebar to position text; whenever possible use the margins, the tabs, or the alignment features (left justify, center, right justify, indent, etc.) instead. If you must use spaces to align text on two separate lines make sure the padding spaces you use are all in the same font and same point size on the upper and lower lines.
- Avoid trying to obtain perfect alignment while using your full-page view; the resolution of the screen often isn't high enough to exactly position the tiny characters.
- Avoid using the automatic word-wrap when needing absolute control of what will be the first word on a line. Instead use a return at the end of the previous line. If there's a phrase that you'd prefer not be split across lines (for example, "San Diego Chargers"), use hard "non-breaking" spaces. Word produces these when you press CTRL-SHIFT-Spacebar (incidentally, ALT-CTRL-*C* yields ©, and ALT-CTRL-*R* yields ®), and WordPro uses CTRL-Spacebar for hard spaces.

You probably don't need a page layout program. Although lines blur between the capabilities of page layout programs and top-end word processors, there are a few things that most page layout programs can do that most word processors can't, including the following:

- They have more precise control of type size (you can get 16.5-point text, for example) and word spacing.
- They can wrap text around irregular objects.
- They can do color separations and multiple threaded columns. (If you don't know what those are, you probably don't need them.)

"Lines blur between the capabilities of ***page layout programs*** *and top-end word processors."*

The enthusiasm of professional layout artists not withstanding, page layout programs have a steep learning curve. If you only do, say, one modest layout project a week, you may be better off learning your word processor's advanced features really well than tackling a super layout program and never really mastering it. You may save yourself $800 or so in the process. ■

Get straight answers to your technical questions. Ask Smart Computing! Send your questions, along with a phone and/or fax number so we can call you if necessary, to: Smart Computing Q&A, P.O. Box 85380, Lincoln, NE 68501. Please include all version numbers for the software about which you're inquiring, operating system information, and any relevant information about your system. (Volume prohibits individual replies.)

Answers to users' most common inquiries.

Hard Drives 101

FAQ: ***What do the abbreviations KB, MB, GB, and TB mean?***

These abbreviations stand for the different units in which hard drive storage space, random-access memory (RAM) capacity, and file sizes are measured. The names of these units of measurement make them sound identical to the metric system, but don't be fooled. By the metric standard, one kilobyte (KB) would equal 1,000 bytes. But that's not the case with computers, which use a binary numbering system. In the computer world, 1KB equals 1,024 bytes. A byte consists of 8 bits, which represents one character and is the smallest piece of data a computer can process.

Going up the scale, a megabyte (MB) equals roughly 1,000KB, or 1,048,576 bytes. A gigabyte (GB) consists of roughly 1,000MB, or 1,073,741,824 bytes. At the top of the storage scale are terabytes (TB), roughly 1,000GB, or 1,099,511,627,776 bytes.

FAQ: ***What are the parts of a hard drive that store data?***

Hard drives store information on the disk in 512-byte **sectors**. A collection of sectors in which files are stored is a **cluster**. Sectors are stored on a **track**, which is basically a circle of sectors on the surface of the disk. A series of concentric tracks constitutes the **cylinder**, which is the entire surface of the disk. Information is read by a head attached to an actuator arm that passes over the surface of the disk.

FAQ: ***What does average seek time mean?***

This is the average amount of time it takes the hard drive to find a specific piece of information. Typically, the average seek time on a good hard drive should be less than nine **milliseconds** (**ms**, 1/1,000 of a second). The difference in physical dimensions of hard drives is a factor in a drive's seek time. A 3.5-inch drive, for example, would have a lower seek time because it's smaller than a 5.25-inch drive.

FAQ: ***What does transfer rate mean?***

Transfer rate refers to the amount of data that a hard drive can transfer per unit of time. Enhanced Integrated Drive Electronics (EIDE) hard drives transfer 16 megabytes per second (MBps), but an Ultra ATA drive can transfer up to 33.3MBps. Small Computer System Interface (SCSI) drives can be even faster, depending on the specific SCSI protocol the drive uses. For example, an Ultra-2, 16-bit SCSI drive can transfer data at 80MBps. Of course, you'll have to pay more for the benefit of a faster transfer rate. A common EIDE 5GB hard drive sells for about $170, whereas a 5GB Ultra SCSI drive can cost more than $400.

There is not necessarily a direct relationship between a hard drive's seek time and its data transfer rate. The data transfer rate is dependent on the hard drive's interface, not the seek time. If you have a regular EIDE hard drive with a 9ms seek time, it will be able to transfer only up to 16.6MBps, but an Ultra ATA hard drive with a 9ms seek time can transfer up to 33.3MBps, as stated above.

FAQ: ***What is the difference between an EIDE hard drive and a SCSI hard drive, and which one should I buy?***

EIDE and SCSI are different types of **interfaces**, which is the connection between the hard drive and the rest of the computer. EIDE drives are much more common, and cheaper. SCSI, while less common and more expensive, can be faster than EIDE drives. SCSI drives require a special SCSI controller card, however, which usually must be installed in the computer. Most new systems do not have a SCSI controller card built into them, although some manufacturers give you that option at the time of purchase. If the manufacturer provides the option of ordering a new computer with a SCSI hard drive, the required SCSI controller card will obviously be part of the package as well.

Your needs determine whether you require an EIDE or SCSI hard drive. Most users will be satisfied with the performance of an EIDE hard drive, but some users may find that the extra cost and hardware requirements of a SCSI drive are worth the boost in speed. Those who work extensively with many graphics or multimedia will appreciate the extra punch a SCSI drive can deliver.

A fairly new type of EIDE hard drive transfers data at much higher rates. These Ultra ATA drives can transfer up to 33.3MBps and are often included in new computer systems. ■

You work in a virtual office. Perhaps you could use a virtual home.

As in the one just voted #1 for extended stays by *Business Travel News*.[1]

That way, while you're out faxing and downloading from the road, you can feel right at home. Stretch out in one of our spacious, two-room suites with private bedrooms, living rooms and fully equipped kitchens. Enjoy our complimentary breakfast and nightly manager's reception.[2] Oh, and what virtual home would be complete without a separate dataport.

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[1]BTN™ Feb. 23, 1998 issue, Top US Hotel Chain Report. [2]Available M-Th only. Subject to state and local laws. ©1998, Promus Hotels, Inc.

When you need help resolving computer service problems, bring your questions to Action Editor.

Sound Off!

I'm having trouble with Gateway's handling of a problem with my still quite-new machine. When the machine is put to sleep using the "sleep" key on the multifunction keyboard or using "suspend" in Windows 95 (Win95), it awakens from sleep mode with a tremendous increase in volume (as compared to the normal volume level).

The latest word I have from Gateway is that it doesn't know what the problem is and even reformatting my hard drive (at Gateway's suggestion) probably will not solve the problem.

The latest suggestion is for me to disable the power management feature in my Basic Input/Output System (BIOS) setup. I feel this is not a satisfactory solution to a problem that should not exist. I have also been speaking with someone via E-mail who has the same problem.

George Castonguay
New Braintree, MA

We put George in contact with a technician who works with a special Gateway team of troubleshooters. The two worked on the problem for more than a month before George's problem was resolved. The solution came down to adjusting the volume at startup using the PC's software controls rather than the volume control on the speaker.

Can you furnish me with the E-mail address of suppliers of special keyboards for disabled persons limited to the use of one hand?

Robert Meints
Kansas City, MO

We contacted Instruments and Equipment Co., which is a wholesaler of keyboards designed for disabled people. Instruments and Equipment, however, is unable to answer questions from end users.

If you're interested in one of the companies products, ask any computer store to call them to place an order. The representative at Instruments and Equipment is Charles Rosso; his phone number is (973) 579-0009. Visit the Instruments and Equipment World Wide Web page at http://www.iepos.com. Remember that Instruments and Equipment is a wholesaler, which means they have no return policy and are unequipped for tech support and other retailer perks. You can view one of the products at http://www.tipro.si/Products.htm.

The T172 ($310) is almost like a regular keyboard except it contains an acrylic cover so only one key can be pressed at a time. It can complete up to 100 million operations (instead of 500,000 as in a typical keyboard). The keys can be programmed to have a delay so that if a finger remains on one of them too long, you won't produce a long string of characters on-screen as you would with a normal keyboard.

About a year ago, I downloaded a program called Plug-In off the Internet. The parent company is named Plannet Crafters. Plug-In is an enhancement for Windows 3.x and works very well, but the unregistered version is limited and causes a startup delay. I have tried to register it many, many times without any luck.

I've called Plannet Crafters, sent E-mail messages, sent letters through snail mail, and have even thought about carrier pigeons. And with all this, I still haven't had any luck. I know someone is there because I have a canceled check from March, which means they have my money. To this day, however, I still don't have a registered version.

My machine stalls every time I run Windows. If Plug-In wasn't such a good program, I'd ditch it.

Keith Zollinhofer
Severn, MD

Plannet Crafters is a small company that changed its business strategy a year ago. In moving from a mail-order operation to an Internet-based operation, the company went from seven employees to one. The result was that Plannet Crafters has a tough time handling its older products (for example, Plug-In), particularly because its phone numbers and E-mail addresses have changed.

In any case, a company spokesperson assured us (through E-mail) that Plannet Crafters believes in its customers and hopes that this sort of problem doesn't happen in the future. To contact the company call (770) 752-5416 or send an E-mail message to software@plannetarium.com. You will also find information at its Web site at http://www.plannetarium.com.

Keith sent us an E-mail message and said his product has been registered.

Are you having trouble finding a product or getting adequate service from a manufacturer? If so, we want to help solve your problem. Send us a description of the product you're seeking or the problem you had with customer service. In billing disputes, include relevant information (such as account numbers or screen names for online services) and photocopies of checks. Include your phone number in case we need to contact you. Letters may be edited for length and clarity; volume prohibits individual reply. Write to: **Action Editor, PO Box 85380, Lincoln, NE 68501-5380.** Or Send E-mail to **editor@smartcomputing.com.** Or fax us at **(402) 479-2104.**

backward compatible—The ability of new devices or programs to recognize and make use of existing devices, programs, or data.

bit—Short for binary digit, the smallest unit of computer storage. A bit is a single digit in a binary number, either 1 or 0, often called "on" or "off." Physically, the bit can be represented as a transistor in a memory cell, a magnetic spot on a disk, or a pulse sent through a circuit.

bus—The connection linking electronic devices such as the internal components of a computer.

cartridge—A self-contained device, usually in a protective plastic shell. Common cartridges include ink cartridges and toner cartridges for printers.

catalog—A list of information about files or storage space. File details might include name, length, type, and location.

enhanced keyboard—This type of keyboard comes with most PCs sold today. It includes 101 or 102 keys and is distinguished from older keyboards by its 12 function keys across the top and separate numeric keypad on the right.

formatting—Preparing a diskette or hard drive so it can store information. Formatting organizes the tracks and sectors that store information and erases all previously stored information.

gigabyte (GB)—Approximately 1 billion bytes, or 1,000 megabytes. One gigabyte equals 1,073,741,824 (2 to the 30^{th} power) bytes or 1,024 megabytes, but these figures are typically rounded to 1 billion. Gigabyte is the most common unit of measurement used for hard drive storage capacities.

head—The read/write head inside a disk drive that uses magnetic-electric currents to store and access digital information on platters. The movements of the read/write heads are controlled by a mechanism called the head actuator.

hertz (Hz)—Equals one cycle per second, measuring the waves or frequencies of electric vibrations. Hertz is used to measure screen refresh rates and the speed of microprocessors (in terms of the larger megahertz).

laser—An intensely focused beam of light. Lasers have many uses, from reading stored optical data (such as on CD-ROMs) to high-quality printing (laser printers).

mass storage—Describes techniques for holding large quantities of data. Data stored on mass storage devices, including tapes, diskettes, or CD-ROMs, can be retrieved at a later date.

patch—A piece of code inserted into a program to temporarily fix a defect. Programmers create patches to add features to a program while users await the release of new version of the software that includes the "patched" features.

platter—The circular disk inside a hard drive that holds the actual information. There are multiple platters inside a single hard drive.

Program Manager—The main window of Windows 3.x. The Program Manager holds icons representing program groups, which hold icons for applications.

storage—The holding of information for later use. A computer has two basic types of storage: internal and external. Internal storage refers to information accessible and loaded into memory when the system boots up. External storage refers to the computer's hard drive, diskette drives, and backup tape drives.

storage device—Any piece of computer hardware used to hold digitized information. There are two types of storage devices: primary and secondary. Primary storage devices such as random-access memory (RAM) hold information for only a short period of time. This data usually is lost when a computer is shut down. Secondary storage devices such as diskette drives are a more long-term form of storage; they hold information until it is deleted or overwritten.

SuperDisk—A trademark for drives that use LS-120 technology. This removable diskette format developed by Imation stores 120 megabytes (MB) of data on a standard-size, 3.5-inch diskette. The drives are backward-compatible with older diskettes, enabling a user to replace a standard diskette drive while still maintaining access to data on the older diskettes. LS-120 drives (the LS stands for laser servo) use a laser to position the read/write head precisely over the correct track on the diskette. This technique allows LS-120 media to have a per-inch track density of 2,490, compared to 135 for the older diskettes.

system diskette—A flexible diskette that holds operating system information. A system diskette can help the start system in case of a serious system error.

track—A data storage ring on a diskette or hard drive. A double-density (DD) diskette contains 80 concentric tracks and a high-density (HD) diskette has 160. Tracks are recorded onto a diskette by an operating system during a diskette format and can be further broken down into sectors.

Universal Serial Bus (USB)—A new type of external bus expected to replace parallel and serial ports. With a maximum transfer speed of 12 megabits per second (Mbps), USB is designed primarily for low- to mid-speed peripheral devices, such as keyboards, mice, modems, printers, joysticks, and some scanners.

Looking Smart

A New Look For The Information You Depend On

YOU PROBABLY AREN'T WORRIED if this is the last page you're reading in this magazine. If, however, you're a "backward flipper" who turned first to this page or you've only skimmed the rest of the issue, you may be having some doubts about our magazine's new look. Could this be New Coke all over?

Think of it more as the updated Volkswagen Beetle. *Smart Computing's* new look puts a fresh face on the same product and core focus that has served our readers for more than eight years. Those worried about us taking the path of New Coke can rest assured that our secret formula is unchanged.

A graphical redesign (sometimes several) is a normal step in the life cycle of every successful magazine. Publications striving to stay vibrant in the volatile and competitive world of publishing must constantly judge when its time for a facelift. Houses get new coats of paint; magazines get fresh sets of fonts and design templates. Our redesign project began months ago with the goal of creating a new look that was more attractive and more practical for readers. Our priorities for new article designs included making information more readily accessible, major points more quickly recognizable. Our designers kept these objectives before them as they proposed designs and held them up to critical review during the process. Any enhancement, no matter how eye-catching, that didn't serve to make the content more useful fell to the cutting room floor. Technical detail guided major decisions, such as picking the text to use for the body of main articles. Did you know that serif type, which has small extensions on the strokes of letters, serves to visually connect words? This simplifies reading for our minds, which are attuned to recognizing shapes of words rather than individual letters. Thus, you'll find the body type of our main articles uses serif type.

The final product made up of such details is one we think you'll like, even if you can't exactly name everything that has changed or even why you like it. Graphical design is usually like a sports referee, at its best when facilitating the main action and going virtually unnoticed itself. Our hope is that you'll find *Smart Computing* more appealing, but that you'll get into the text so easily you don't stop to pinpoint how the look has changed. Solid content, after all, is what you pay us for—and what we're committed to producing. Thus, you'll notice that our redesigned magazine's informational content is consistent with earlier issues in features such as PC Operating Instructions, Quick Studies, Q&A, and more.

Our new look is just the latest step in a larger improvement effort for *Smart Computing* and its entire family of products. Our readers have noticed several new features added to recent issues of the monthly magazine. We introduced a monthly HTML tutorial to the Quick Studies section to help budding World Wide Web designers learn essential skills. Our expanded Q&A section now includes Frequently Asked Questions (FAQs) that answer the elementary questions every users asks at some point. Find It Online grew this year to include a second page highlighting free software and activities you can check out on the Web.

Development continues on our Web site at http://www.smartcomputing.com. Highlights of the site include a searchable index of all our printed issues and a Q&A board where readers can post and answer each others' questions. We add the text of each new printed issue as it is published. The site is currently open to all visitors, although in the future it will be open only to *Smart Computing* readers. We encourage everyone to visit the site and see our progress during this trial period.

Take advantage of the Web site's E-mail link to tell us what you think of our improvement efforts, or send us a message at any time at editor@smartcomputing.com. You, our customers, are the final judges on each improvement we make. Let us know whether you think our magazine's graphical redesign and other improvements have achieved our goal of producing a magazine that's current, yet still a classic. ■

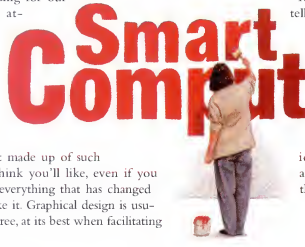

Illustration: Dave Hall

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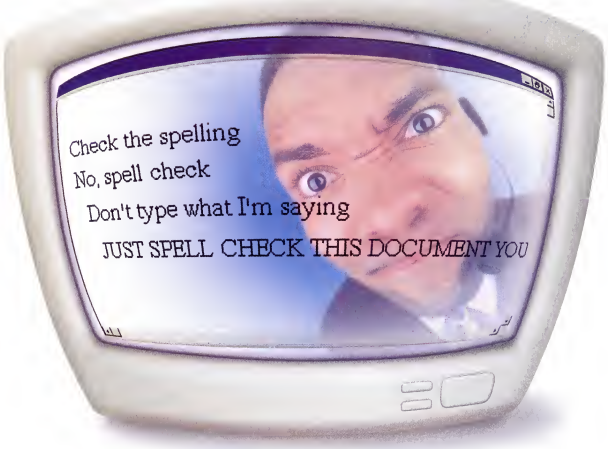

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